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No. 69

ALFRED ERNEST SCHUYLER FESTSCHRIFT

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BARTONIA

Journal of the Philadelphia Botanical Club

Since its founding in 1891, the Philadelphia Botanical Club has offered outstanding programs, field trips, and other opportunities for those with an interest in plants to meet and exchange information. Monthly meetings (www.philbotclub.org/meeting.html) feature speakers from various botanical backgrounds. They are held at 7:30 p.m. on the fourth Thursday of the month in September, October, and January through May and the third Thursday in November and December, usually at the Marvin Comisky Conference Center, One Logan Square (one block east of the Academy of Natural Sciences of Drexel University). From April to October, expert field botanists lead field trips in the mid-Atlantic region and occasionally elsewhere in North America or overseas (www.philbotclub.org/field_trips.html).

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Bartonia, in publication since 1909, was named for William P. C. Barton (1786-1856), Professor of Botany at the University of Pennsylvania and author of the first local flora (1818), *Compendium Florae Philadelphicae* (and nephew of physician and botanist Benjamin Smith Barton, who was a mentor of the explorer Meriwether Lewis). The journal began as an annual abstract of the Club's proceedings with short articles on the plants of the Philadelphia area. Its scope has broadened to encompass original research in plant systematics, plant ecology, and plant conservation biology with articles on floristics, distribution, methods, biography, bibliography, history of botanical exploration, and other topics of botanical interest ranging throughout—and well beyond—the mid-Atlantic region.

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Ernie Schuyler in FDR Park, Philadelphia, PA, 13 October 1999. Photo by Richard Horwitz.

Bartonia No. 69: 1, 2016

Introduction

WILLIAM H. ROBERTS

Considering the number of highly talented botanists who owe an important part of their early interest, encouragement and/or their professional achievement in botany to advice and inspiration from Alfred E. "Ernie" Schuyler, it seemed appropriate to set aside a day to share our appreciation in the form of contributions to botanical learning. When word went out, there was a burst of immediate interest. The papers published in this issue of *Bartonia* are some of the presentations shared on Saturday, October 10, 2015, when the day-long symposium was held at the Pennsylvania Horticultural Society's McLean Library in Philadelphia. Our moderators were Ann Fowler Rhoads and Richard "Rick" McCourt. Ernie gave a presentation, "On the work of colonial and early American botanists," and Carrie Kiel, a former employee in the Botany Department of the Academy, also traveled from Rancho Santa Ana, California, to summarize the research for which she was awarded the Cooley Award of the American Society of Plant Taxonomists for Best Contributed Paper in Plant Systematics. Neither of these excellent works is included in this issue. But, most of the teams of authors and/or presenters are represented in this issue—Wayne Ferren, Rob Naczi, Wesley Knapp, Ted Gordon, Joe Arsenault, David Hewitt, James Lendemer, John Braxton, Gerry Moore, Elizabeth McLean, Henry Hespenheide—along with artwork by MaryFran Cardamone and Brian Ames.

The symposium was attended by friends, colleagues, members of the Philadelphia Botanical Club, and regulars from Botany Happy Hour (founded approximately eleven years ago by Ernie and James Lendemer; its one rule: "No unhappy thoughts are permitted"). Following the presentations, the attendees enjoyed a variety of carefully selected craft beers. Henny Youngman was there in spirit. Philadelphia has enjoyed such a rich history of botanical scholarship—John and William Bartram, Henry Muhlenberg, Benjamin Barton, William Barton (for whom the journal *Bartonia* is named), Frederick Pursh, Thomas Nuttall, Lewis David von Schweinitz, Constantine Rafinesque, William Darlington, Witmer Stone, Francis Pennell, Edgar Wherry, Bayard Long, and others. We thank all the authors and attendees. We are grateful for the support of the Philadelphia Botanical Club, its Executive Committee, and its members, and the Pennsylvania Horticultural Society (especially Janet Evans) for friendship, hospitality and use of the facilities. We are very grateful for the excellent editorial work of Dr. Sasha Eisenman, the Editor of *Bartonia*, who prepared this issue for publication.

This issue is dedicated to Ernie Schuyler, who has taught us all.

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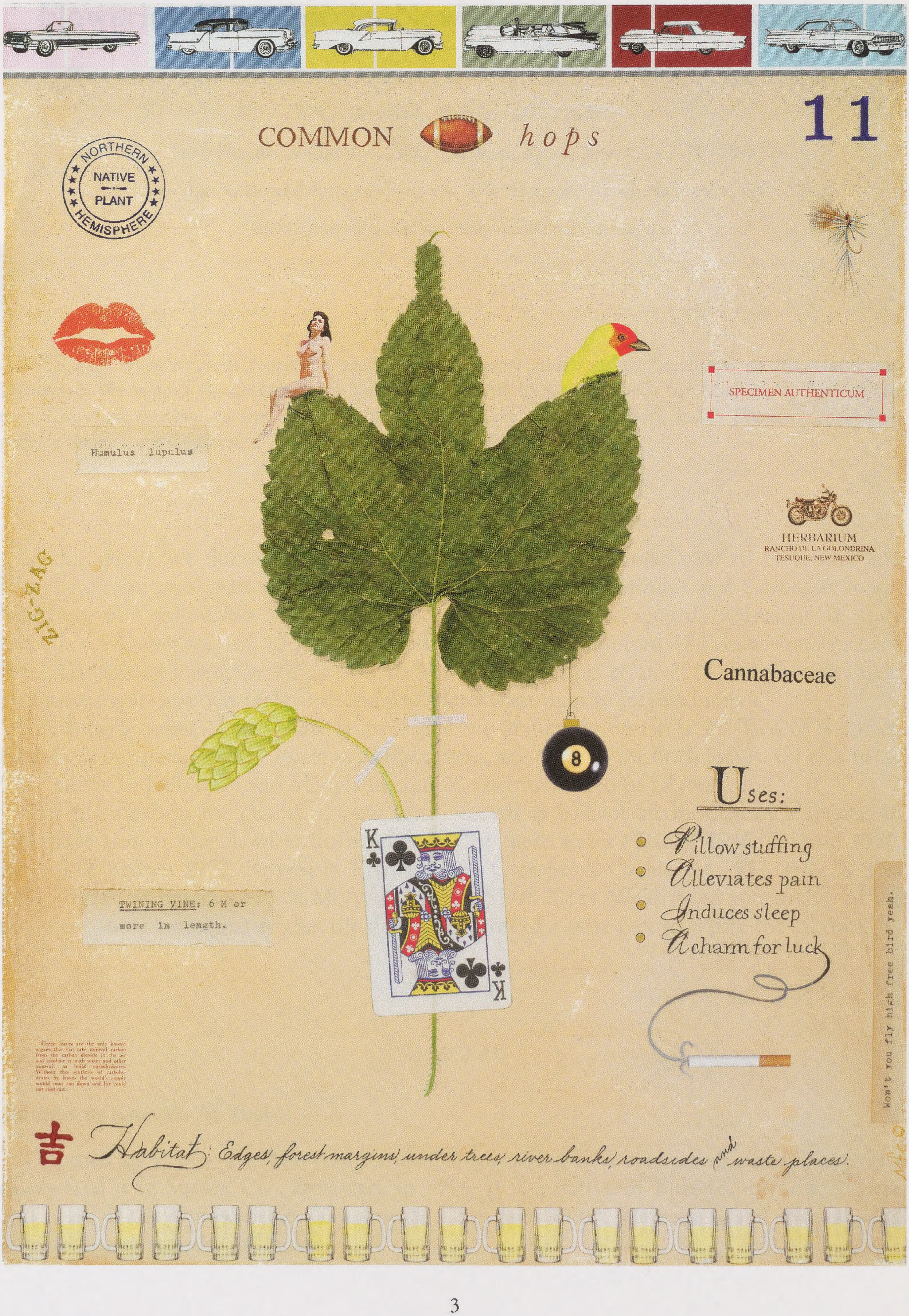
COMMON hops
11
NORTHERN HEMISPHERE
NATIVE PLANT
SPECIMEN AUTHENTICUM
Humulus lupulus
HERBARIUM
RANCHO DE LA GOLONDRINA
TESUQUE, NEW MEXICO
ZIG-ZAG
Cannabaceae
8
Uses:
Pillow stuffing
Alleviates pain
Induces sleep
A charm for luck
TWINING VINE: 6 M or more in length.
K
Won't you fly high free bird yeah.
Green leaves are the only known organs that can take mineral carbon from the carbon dioxide in the air and combine it with water and other minerals to build carbohydrates. Without this synthesis of carbohydrates by leaves the world's supply would soon run down and life could not continue.
吉
Habitat: Edges, forest margins, under trees, river banks, roadsides and waste places.

Bartonia No. 69: 5–19, 2016

Flowering Plant Species New to Delaware and Maryland

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ABSTRACT. Recent field work has revealed many new additions to the floras of Maryland and Delaware. We report 16 state records for Delaware and 13 state records for Maryland. Two of the taxa, *Ludwigia hexapetala* and *Cenchrus purpurascens*, are records for both States. We also report two rediscoveries for Maryland, *Gaylussacia dumosa* and *Coreopsis rosea*.

INTRODUCTION

In this paper, we document discoveries of flowering plant taxa new to Delaware and Maryland, and two rediscoveries in Maryland (*Gaylussacia dumosa* and *Coreopsis rosea*) based on our collections from 2004–2015. These new state records represent 16 state records for Delaware and 13 for Maryland. Recently, we reported 18 taxa as state records for Delaware and another 18 as new to Maryland (Knapp et al. 2011). Obviously, field botanical exploration in Delaware and Maryland continues to be productive.

The total number of new state records that we document herein is 29. Two of the taxa, *Ludwigia hexapetala* and *Cenchrus purpurascens*, are records for both States. Of this total, 9 are native to Delaware and Maryland, and 20 are introduced or adventive.

Our justification for claims of new state records is lack of attribution of a species to Delaware and/or Maryland in floristic works for these states (Tatnall 1946, Fernald 1950, Brown & Brown 1972, Brown & Brown 1984, Gleason & Cronquist 1991, Frye & Lea 2001, Terrell & Peterson 2009, McAvoy 2015, USDA 2015). We divided authorship of the taxon accounts among us so that the first discoverer of a state record wrote the account.

RESULTS

APIACEAE

***Anthriscus caucalis* M. Bieb.**

This species is new for Maryland and it is spreading in Delaware. Keith Clancy first discovered it in Sussex Co., Delaware in 1996. It is a native of Europe, introduced here and there in the United States (Gleason & Cronquist 1991). We have found it on shaded hillsides, open woods, and fields.

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: Lewes, 10 May 1996, *Clancy 3785* (DOV); 16 May 1996, *Clancy 3809* (DOV); Collins Mill Pond, Gravelly Branch, 26 May 2005, *Longbottom 5875* (DOV); Seaford, 13 May 2011, *Longbottom 14913* (NY); Collins Mill Pond, Gravelly Branch, 16 May 2011, *Longbottom 14952* (NY); Prime Hook National Wildlife Refuge, Boardwalk Trail, 23 May 2014, *Longbottom 20782, Hudson & Rizzo* (DOV, MARY, NY). **MARYLAND, CAROLINE CO.:** Town of Preston, 22 May 2011, *Longbottom 15010* (DOV, MO, MU, NY).

Torilis arvensis (Huds.) Link

We are reporting this species as new for Delaware. It is a native of Europe (Gleason & Cronquist 1991). This population is along a road bed at the edge of a salt marsh in full sun.

Voucher specimen(s): U.S.A., DELAWARE, SUSSEX CO.: Fenwick Island, 18 June 2011, *Longbottom 15252* (DOV, MO, NY); Fenwick Island, 18 June 2012, *Longbottom 17564* (NY).

ASTERACEAE

Coreopsis rosea Nutt.

Coreopsis rosea is a globally uncommon species ranging from Nova Scotia south to Georgia (Gleason & Cronquist 1991). It was last reported by K. McCarthy on 21 Aug 1987 (Maryland Natural Heritage Program Field Form) from a private property site in Caroline County. McCarthy's location has undergone significant land use changes since her report and has not been relocated. In 2007 Naczi informed Knapp of another population he had co-discovered in 1985. Unfortunately, there was no voucher known to document this discovery and the precise location of this population was unknown. In 2011 Knapp relocated Naczi's population and made the first documentation of this species in Maryland in 25 years. It is abundant along a roadside and in wet pasture/Delmarva bay wetland kept in early succession by the landowner by mowing and horse pasturing. *Coreopsis rosea* is associated with *Eryngium aquaticum* L., *Boltonia asteroides* (L.) L'Hér., and *Lycopus americanus* Muhl. ex W.P.C.Barton.

Voucher Specimen(s): U.S.A., MARYLAND, QUEEN ANNE'S CO.: East side of Teats Branch Road and 0.3 mi. N of the intersection with Busic Church Road, 16 August 2011, *W.M. Knapp 3327* (TAWES).

Grindelia lanceolata Nutt.

This is a new species for Maryland. It is native to Alabama, Arkansas, Kansas, Kentucky, Louisiana, Missouri, Oklahoma, Tennessee, and Texas, and has been introduced to Connecticut, Ohio, Virginia, and Wisconsin. (Strother & Wetter 2006) We found it in open fields along an old railroad bed under a powerline right of way.

Voucher Specimen(s): U.S.A., MARYLAND, ANNE ARUNDEL CO.: Brandon Shores, Kembo Road, 3 August 2014, *Longbottom 21406 & G. Van Velsir* (MARY, NY).

Iva annua L.

We are reporting this species as new for Maryland. It is native to the Eastern half of the United States as far west as New Mexico and Colorado (Strother 2006); it is absent from Delaware, New Hampshire, New Jersey, New York, and Vermont.

Voucher Specimen(s): U.S.A., MARYLAND, CAROLINE CO.: Idylwild Wildlife Management Area, 24 September 2010, *Longbottom 14356* (DOV, MO, NY).

BRASSICACEAE

Descurainia pinnata (Walter) Britton subsp. *pinnata*

Descurainia pinnata is a wide-ranging mustard that occurs throughout most of North America and northern Mexico (Goodson & Al-Shehbaz 2010). *Descurainia pinnata* subsp. *pinnata* occurs in Atlantic coastal states from North Carolina south to Florida and west to Texas. Plants of this subspecies inhabit a wide range of disturbed sites such as roadsides, ground along railroads, and abandoned fields.

Our collections appear to represent new state records for Delaware. At the Concord site, plants were infrequent and grew in sunny, dry-mesic, loamy sand of a frequently disturbed (by motor vehicle traffic), weedy, open, neglected lot with rather sparse vegetation. At Cool Spring, plants were scattered along the edge of agricultural fields. *Descurainia pinnata* subsp. *pinnata* is almost certainly non-native in Delaware, judging from the anthropogenic nature of the habitats and the disjunction from the nearest apparently native population of the taxon in North Carolina. Additionally, we observed it growing intermixed with the non-native *Corydalis micrantha* (discussed below).

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: Concord, 21 Apr 2011, *Naczi 13432* (NY); 2 May 2011, *Longbottom 14816* (NY); Cool Spring, 28 April 2012, *Longbottom 17178* (NY).

Lepidium oblongum Small

This is the first report of this species in Maryland. It is native to Arizona, Arkansas, California, Kansas, Louisiana, Mississippi, Missouri, New Mexico, Oklahoma, Texas, and Mexico (Al-Shehbaz & Gaskin 2010).

Voucher Specimen(s): U.S.A., MARYLAND, QUEEN ANNE'S CO.: Queenstown, 19 April 2009, *Longbottom 12518* (DOV, GH, MARY, MO, NY, PH, US).

CYPERACEAE

Carex austrina Mack.

Carex austrina is a sedge native to dry-mesic prairies, forest openings, and forest edges in the mid-western U.S.A. (Ball 2002). In recent years, collectors have discovered the species farther east, in Maryland in 1998 (Frye & Lea 2001), in Virginia in 2005 (Simmons et al. 2008), and in Ohio in 2009 (Vincent et al. 2011). Thus, it is not a great surprise that a species expanding its range and already present in the Mid-Atlantic would reach Delaware, where our collections are apparently the first. We found a few plants inhabiting a clearing in a dry-mesic, deciduous-pine forest in very sandy soil. The clearing was the neglected yard of a long-vacant residence.

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: 2.0 mi. W of Bethel, 3 May 2011, *Naczi 13599, Werier, & Longbottom* (NY); *Longbottom 14840, Naczi, & Werier* (NY).

Carex fissa Mack.

We are reporting this species as new to Delaware and spreading in Maryland. It was originally reported in Maryland based on one collection from Talbot Co. (Knapp et al. 2011). *Carex fissa* is native to Kansas, Missouri, Oklahoma, and Texas (Standley 2002). We have found it in roadside ditches and sediment control ponds.

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: East of Bridgeville, 18 June 2011, *Longbottom 15250* (NY). **MARYLAND, QUEEN ANNE'S CO.:** Town of Centreville, 19 June 2011, *Longbottom 15258* (NY). **TALBOT CO.:** Town of Newcomb, 20 June 2013, *Longbottom 19672* (NY). **WORCESTER CO.:** West Ocean City, 20 June 2013, *Longbottom 19675* (NY); town of Berlin, 25 June 2013, *Longbottom 19766* (NY).

Carex gravida L.H. Bailey

Carex gravida ranges from Ontario west to Saskatchewan, south to Georgia and New Mexico (Ball 2002, USDA 2015). It inhabits dry-mesic sites in prairies and forest openings and edges. The collection cited below appears to be the first from Delaware. At this site, it was frequent within a clearing in a dry-mesic, deciduous-pine forest in very sandy soil. The clearing was the neglected yard of a long-vacant residence.

Though *C. gravida* has been known from adjacent Maryland and Pennsylvania, the collections from these states are recent (Rhoads & Klein 1993, Frye & Lea 2001), supporting the contention that this species is non-native this far east (Frye & Lea 2001). Certainly, the location and habitat of the Delaware collection support non-native status since it was found in a forest opening created by humans and supporting the non-native *C. austrina* (discussed above).

Voucher Specimen(s): U.S.A., DELAWARE. SUSSEX CO.: 2.0 mi. W of Bethel, 3 May 2011, *Naczi 13596, Werier, & Longbottom* (NY); *Longbottom 14889, Naczi, & Werier* (NY).

Carex leavenworthii Dewey

Carex leavenworthii ranges from New York west to Wisconsin and Nebraska, south to Florida and Texas (Ball 2002, USDA 2015). It also occurs in California, where it is introduced (Ball 2002). This sedge grows in a variety of habitats, which usually have a history of recent disturbance, such as floodplains, lawns, and roadsides. It is known from all the states bordering Delaware (Maryland, New Jersey, and Pennsylvania), and thus had been expected in Delaware. Our collections appear to be the first for the state. Habitat at the Blair's Pond site was a lawn in a recreation area and *C. leavenworthii* was common there. At the site west of Bethel, we discovered a few plants growing in a clearing in a dry-mesic, deciduous-pine forest in very sandy soil. This clearing was the neglected yard of a long-vacant residence. The habitat at the site west-southwest of Bethel was a lightly shaded, sandy roadside, where the species was rare.

It is most likely *C. leavenworthii* is non-native in Delaware. We found this species in the same anthropogenic habitat as the non-native *C. austrina* (discussed above). *C. leavenworthii* is known to be weedy and is suspected of expanding its range in the eastern U.S.A. (Naczi & Thieret 1996, Bryson & Carter 2008).

Voucher Specimen(s): U.S.A., DELAWARE, KENT CO.: Blair's Pond, on Williamsville Road (Road 443) 15 May 2012, *Longbottom 17297* (NY). **SUSSEX** CO.: 2.0 mi. W of Bethel, 3 May 2011, *Naczi 13600, Werier, & Longbottom* (NY); 2.5 mi. WSW of Bethel, 3 May 2011, *Naczi 13613, Werier, & Longbottom* (NY).

Cyperus filiculmis Vahl

Cyperus filiculmis is native to Atlantic coastal states of the U.S.A., from Maryland south to Florida and west to Texas (Marcks 2002, Voss & Reznicek 2012). Our collection appears to be the first for Delaware, and a minor northward range extension from southern Maryland. At the Delaware site, *C. filiculmis* was frequent on the sunny, dry-mesic, sandy edge of a pine forest. Both the habitat and proximity of previously known populations suggest that *C. filiculmis* is native to Delaware.

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: 5.8 mi. WNW of Bridgeville, 16 July 2011, *Naczi 13748* (NY).

Schoenoplectus torreyi (Olney) Palla

Schoenoplectus torreyi is a species ranging from New Brunswick and Manitoba, south to New Jersey, Pennsylvania, and Virginia (Gleason & Cronquist 1991). *Schoenoplectus torreyi* was first attributed to Maryland [as *Scirpus torreyi* Olney] by Whitman (1954) in his thesis entitled *The Flora of Cecil County*. This species was considered historic/extirpated by the Maryland Natural Heritage Program (2010) even though no known specimen exists to validate Whitman's attribution of the species to the Maryland flora. *Schoenoplectus torreyi* was discovered in an artificial pond in a well-surveyed and high quality natural area owned by The Nature Conservancy, where it is dominant and forms a dense zonal ring of vegetation. This marks the first known collection of this species from Maryland.

Voucher Specimen(s): U.S.A., MARYLAND, GARRETT CO.: Finzel Swamp Preserve, 9 September 2013, *Knapp 4518* (MARY, NY, PH, TAWES, US).

Scleria oligantha Michx.

First attributed to Maryland by Brown & Brown (1984) who stated, "wet meadows, clearings and woods; in W-B [Washington-Baltimore] area." Searches at Frostburg State University Herbarium, MARY, and US have revealed no specimens supporting such attribution. FNA (2002), Gleason & Cronquist (1991), USDA Plants, Weakley (2015), etc. all omit Maryland in the range of this species. This discovery marks the first known specimen of this species to Maryland. This specimen was collected by Sam Tessel as part of a vegetation inventory program with the National Park Service. Knapp provided the specimen identification and pointed out its significance. Subsequent work to relocate this species to attain population information revealed the GPS location on the Tessell specimen was incorrect. Tessell, Treher, & Knapp conducted fieldwork in 2013 to relocate the species and obtain the necessary information to list this species as Endangered in the State of Maryland.

Voucher Specimen(s): U.S.A., MARYLAND, MONTGOMERY CO.: Great Falls area/ Goldmine Tract, 20 June 2005, *S. Tessel 185* (National Park Service Museum Resources Center); Bear Island, just NW of Washington D.C., just off Billy Goat Trail on southern edge of island overlooking Potomac River, 1 June 2013, *Knapp 4295, Tessel, & Treher* (TAWES).

ERICACEAE

Gaylussacia dumosa (Andrews) Torr. & A. Gray

This is the first record of *Gaylussacia dumosa* from the Eastern Shore of Maryland and a rediscovery to the Flora of the Delmarva Peninsula. Robert R. Tatnall last collected this species on Delmarva from Ellendale, in Sussex Co., Delaware in 1927 (*Tatnall s.n.*, DOV). The collections below also mark only the second and third populations known from the state of Maryland. *G. dumosa* is found from Newfoundland and Labrador south to Florida and west to Louisiana (Gleason & Cronquist 1991).

At the site SW of Powellville, we discovered *G. dumosa* to be rare and local on the lightly shaded, wet-mesic, sandy edge of a pine forest with scattered patches of *Sphagnum*. At the Bear Swamp Road site, it was frequent.

Voucher Specimen(s): U.S.A., MARYLAND, WICOMICO CO.: 4.8 mi. SW of Powellville, 12 June 2013, *Naczi 14810, Knapp, & Longbottom* (NY); Just N of the Worcester County border, along E side of Sturges Road. S of Bear Swamp Road intersection ca. 0.4 mi., 12 June 2013, *Knapp 4302, Naczi, & Longbottom* (TAWES); Bear Swamp Road ca. 0.3 mi. E the intersection with Colbourne Mill Road (aka Sturges Rd.), NNE of the town of Snow Hill ca. 10 mi., 8 July 2013, *Knapp 4332 & P. Stango* (NY, TAWES, WVU); Bear Swamp Road ca. 0.3 mi. E of the intersection with Colbourne Mill Road (aka Sturges Rd.), NNE of the town of Snow Hill ca. 10 mi., 29 May 2014, *Knapp 4720 & K. Tashliski* (NY, TAWES).

HYPERICACEAE

Hypericum androsaemum L.

This is the first report of this species in a naturalized setting in the eastern United States. *Hypericum androsaemum* is native to Africa, Asia, and Europe (USNPGS 2015). This species is common in gardens but is known to be an invasive species in Australia, the western United States, and Chile (USNPGS 2015, Weeds in Australia 2015). *Hypericum androsaemum* was found in a former soybean field that was planted in a Conservation Reserve Enhancement Program (CREP) mixed hardwood mix in 2001. It is likely an accidental introduction from the CREP seed mix. The landowners contacted Knapp to determine the identity of the *Hypericum* and were worried about potential invasiveness. Due to these concerns Knapp collected every individual in the field, attempting to eliminate it from the site. It is likely this is now not established at the site due to these actions.

Voucher Specimen(s): U.S.A., MARYLAND, QUEEN ANNE'S CO.: E of Stagwell Road and above Quarter Creek, old soybean field planted in CREP mixed hardwood in 2001, possibly an accidental introduction from the CREP seed mix, two large plants observed with many flowering stalks. All were collected due to weedy nature of this species in the Western U.S.A., 2 Jun 2010, *Knapp 3069* (DOV, MARY, US).

JUNCACEAE

Juncus compressus Jacq.

We are reporting this species as new for Delaware and spreading in Maryland. Eduards Baltars first collected this species in Maryland in 1961 in Wicomico Co. (*Baltars 3707*, Cylburn Arboretum Herbarium). This is a European species of salt marshes (Gleason & Cronquist 1991). All of our collections have been from along roadsides where heavy salting in the winter seems to have created the requirements this plant needs.

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: Town of Harbeson, 18 May 2011, *Longbottom 14957* (NY); town of Gumboro, 6 June 2011, *Longbottom 15174* (NY); town of Laurel, 1 June 2011, *Longbottom 15156* (NY); town of Harbeson, 8 June 2011, *Longbottom 15175* (NY); east of Ellendale, 3 June 2013, *Longbottom 19377* (NY). **MARYLAND, ANNE ARUNDEL CO.:** Town of Brooklyn Park, 2 June 2009, *Longbottom 12902* (NY); town of Odenton, 20 May 2010, *Longbottom 13340* (NY); town of Odenton, 22 May 2010, *Longbottom 13359* (NY); Town of Cape Saint Claire, 27 May 2010, *Longbottom 13395* (NY); town of Gambrills, 29 May 2010, *Longbottom 13406* (NY); town of Pasadena, 1 June 2010, *Longbottom 13498* (NY); town of Cape Saint Claire, 7 June 2010, *Longbottom 13547* (NY). **CAROLINE CO.:** Dover Bridge Marsh, 5 June 2006, *Longbottom 7449* (DOV); along MD Rt. 16, Harmony Road, 2 June 2015, *Longbottom 22949* (DOV, MARY, NY); along MD Rt. 317, 6 June 2015, *Longbottom 22960* (DOV, MARY, MO, NY, US). **DORCHESTER CO.:** Ragged Point Marina Road, 5 July 2008, *Longbottom 11719* (DOV, NY); along MD Rt. 318, 2 June 2015, *Longbottom 22950* (DOV, MARY, NY). **HOWARD CO.:** Town of Dorsey, 4 June 2010, *Longbottom 13532* (NY). **QUEEN ANNES CO.:** Town of Grasonville, 14 July 2007, *Longbottom 9865* (DOV); Kent Island, 26 June 2008, *Longbottom 11630* (DOV, NY); Kent Island, 20 May 2010, *Longbottom 13342* (NY); town of Chester, 22 May 2010, *Longbottom 13360* (NY). **TALBOT CO.:** Town of Easton, 17 May 2010, *Longbottom 13319* (NY). **WORCESTER CO.:** Town of Ocean City, 27 June 2008, *Longbottom 11633* (NY).

MALVACEAE

Anoda cristata (L.) Schltdl.

We are here reporting *Anoda cristata* as new for Delaware and we are reporting its spread in Maryland. Janet Ebert & Jack Holt first discovered it in Maryland in 1998, but Brent Steury officially reported it from Queen Anne's Co., Maryland in 2004 (Steury 2004). We have found it in every county on the Delmarva Peninsula south of Queen Anne's Co., Maryland and Kent Co., Delaware. *Anoda cristata* is native to Mexico, Central America and the southwestern United States (Gleason & Cronquist 1991). On the Delmarva Peninsula it is a weed of agricultural fields, growing most often along the edges of soybean and corn fields.

Voucher Specimen(s): U.S.A., DELAWARE, KENT CO.: Town of Milford, 14 October 2011, *Longbottom 16624* (DOV, MO, NY, USF); south of Farmington, 27 September 2012, *Longbottom 18273* (NY, US); town of Harrington, 27 September 2012, *Longbottom 18274* (NY, US); Whiteleysburg Road 5 October 2012, *Longbottom 18321* (NY, US); town of Milford, 5 October 2012, *Longbottom 18322* (NY). **SUSSEX CO.:** Town of Atlanta, 22 September 2011, *Longbottom 16130* (DOV, MO, NY, USF); east of the town of Laurel, 23 September 2011, *Longbottom 16138* (DOV, MO, NY, USF); town of Georgetown, 22 October 2011, *Longbottom 16644* (DOV, MO, NY, USF); town of Hardscrabble, 23 October 2011, *Longbottom 16645* (DOV, MO, NY, USF); town of Reliance, 23 October 2011, *Longbottom 16646* (DOV, MO, NY, USF); town of Millsboro, 17 September 2012, *Longbottom 18235* (NY, US). **MARYLAND, CAROLINE CO.:** Tuckahoe State Park, 6 September 1998, *J. Ebert & J. Holt 126 EH* (DOV); town of Preston, 8 November 2010, *Longbottom 14381* (MO, MU, NY); town of Bethlehem, 14 October 2011, *Longbottom 16622* (DOV, MO, NY, USF); town of Federalsburg, 1 September 2012, *Longbottom 18126* (NY, US); north of Greensboro, 4 October 2012, *Longbottom 18309* (NY, US). **DORCHESTER CO.:** Along MD Rt. 14, 23 September 2011, *Longbottom 16141* (DOV, MO, NY, USF); town of Hurlock, 19 October 2011, *Longbottom 16642* (NY, DOV, MO, NCU, USF); town of Salem, 4 October 2012, *Longbottom 18312* (NY, US); town of Hurlock, 6 October 2012, *Longbottom 18332* (NY, US); town of Hicksburg, 12 October 2012, *Longbottom 18406* (NY); town of Secretary, 14 October 2012, *Longbottom 18412* (NY, US); along Maple Dam Road, 26 October 2014, *Longbottom 22067 & D.W. Hollway, G. Van Velsir* (MARY, NY). **SOMERSET CO.:** Town of Princess Anne, 28 September 2012, *Longbottom 18285* (NY); along US Rt. 13, Ocean Highway, 11 September 2014, *Longbottom 21632 & Brighton* (MARY, NY). **TALBOT CO.:** Town of Easton, 17 October 2011, *Longbottom 16640* (DOV, MO, NY, USF); along MD Rt. 331, Dover Bridge Road, 18 September 2012, *Longbottom 18240* (NY, US); town of Easton, 2 October 2012, *Longbottom 18294* (NY, US). **WICOMICO CO.:** Town of Sharptown, 23 September 2011, *Longbottom 16139* (DOV, MO, NY, USF); town of Hebron, 12 September 2012, *Longbottom 18222* (NY, US); between the towns of Pittsville and Willards, 19 September 2012, *Longbottom 18244* (NY, US); at intersection of Rt. 12 and Spearing Road, 6 October 2012, *Knapp 4251 & Longbottom* (MARY). **WORCESTER CO.:** Town of Berlin, 20 September 2012, *Longbottom 18245* (NY); town of Berlin, 4 October 2012, *Longbottom 18311* (NY).

MELIACEAE

Toona sinensis (A. Juss.) M. Roem.

This is the first report for *Toona sinensis* in Maryland. This species is native to India and Nepal eastward through China, Myanmar, Thailand and Malaysia to Java (Edmonds & Staniforth 1998). *Toona sinensis* was initially planted by a landowner of foreign origin for culinary usage. It has since spread aggressively along the forested bank where it was initially planted. *Toona sinensis* is a species that has been cultivated in gardens and arboreta throughout the United States since the early 1900s (Koller 1978). It has been in California for 100 years (Grotkopp & Rejmanek 2007), without escaping. In addition to Maryland, it is said to be growing in public gardens in Massachusetts, Philadelphia, New Jersey, Illinois, New York, Ohio, and Washington, D.C. (Koller 1978).

Voucher Specimen(s): U.S.A., MARYLAND, MONTGOMERY CO.: Town of Bethesda, 28 November 2011, *K. Kyde s.n.* (TAWES, US).

OLEACEAE

Fraxinus caroliniana Mill.

This species is new for Maryland. It is a native tree of swamps and bottomlands of the coastal plain in the southeastern United States that had been known from southeastern Virginia to east Texas (Gleason & Cronquist 1991). Our discoveries represent a northward range extension for this species.

Voucher Specimen(s): U.S.A., MARYLAND, WORCESTER CO.: Porters Crossing Road at the Pocomoke River, 9 July 2012, *Longbottom 17650* (DOV, MARY, NY, US); Whiton Crossing Road, 16 July 2012, *Knapp 4031* (MARY, NY, TAWES); Just S of Porters Crossing Road, 16 July 2012, *Knapp 4030* (MARY, NY, TAWES); ca. 0.8 mi. S of Porters Crossing Road on Pocomoke River, 7 June 2015, *W. Knapp 5151 & B. Knapp, S. Knapp, H. Knapp* (MARY).

ONAGRACEAE

Ludwigia hexapetala (Hook. & Arn.) Zardini

This species is new to both Delaware and Maryland. It is native to the southeastern United States from North Carolina to Texas (Gleason & Cronquist 1991). The Delaware location is a man-made pond where this species is one of the dominant species along the edges of the pond. In Maryland, we found it in a roadside ditch. We follow the most recent monographic treatment in recognizing *Ludwigia hexapetala* as distinct from *L. grandiflora* (Michx.) Greuter & Burdet (Wagner et al. 2007).

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: Town of Milton, Waggamons Pond, 1 July 2007, *Longbottom 9716 & R.D. Redden, G. Van Velsir, J.D. Saffer* (DOV); 26 July 2011, *Longbottom 15583* (NY); 26 July 2011, *Longbottom 15589* (NY). **MARYLAND, WORCESTER CO.:** N of Showell and SW of Bishopville, 12 August 2011, *Longbottom 15733* (NY); Town of Bishopville, 16 July 2014, *Knapp 4910* (MARY).

ORCHIDACEAE

Platanthera flava (L.) Lindl. var. _flava_

This is the first reported occurrence of this more southern variety of *Platanthera flava* in Maryland. The more northern *P. flava* (L.) Lindl. var. *herbiola* (R. Br.) Luer is the only variety attributed to the State (Sheviak 2002, USDA Plants 2015, Weakley 2015, etc.).

McAvoy and Knapp found 16 flowering plants growing on slightly elevated tussocks in a *Taxodium distichum* (L.) Rich. swamp.

Voucher Specimen(s): U.S.A., MARYLAND, WORCESTER CO.: Purnell Pond, town of Snow Hill, 20 June 2012, *Knapp 3904 & McAvoy* (TAWES).

PAPAVERACEAE

Corydalis micrantha* (Engelm. ex A. Gray) A. Gray subsp. *micrantha

Corydalis micrantha is native to Illinois and Wisconsin west to South Dakota, south to North Carolina and Texas (Stern 1997). Subspecies *micrantha* is chiefly mid-western, occurring from Illinois and Wisconsin west to South Dakota, south to northeastern Texas. It also occurs disjunctly in eastern Tennessee and western North Carolina.

The collections we cite appear to be the first for Delaware. At this site, plants were frequent and grew in sunny, dry-mesic, loamy sand of a frequently disturbed (by motor vehicle traffic), weedy, open, neglected lot with rather sparse vegetation. *Corydalis micrantha* is certainly non-native in Delaware, judging from the anthropogenic nature of the habitat and the disjunction from the nearest apparently native population of the taxon in western North Carolina. Additionally, we observed it growing intermixed with *Descurainia pinnata* (discussed above), which also appears to be non-native in Delaware.

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: Concord, 21 Apr 2011, *Naczi 13431* (NY); 2 May 2011, *Longbottom 14820* (NY).

POACEAE

***Cenchrus purpurascens* Thunb. [*Pennisetum alopecuroides* (L.) Spreng.]**

This species is new for both Delaware and Maryland. It is native to Southeast Asia. It is widely planted as an ornamental (Wipff 2003). We have found this plant along numerous roadsides. Some populations persist for many years and others are present for only a year or two.

Voucher Specimen(s): U.S.A., DELAWARE, NEW CASTLE CO.: Village of Mt. Cuba, west side of Mt. Cuba Road., east side of Red Clay Creek, 27 October 2013, *W.A. McAvoy 7291* (DOV). **SUSSEX CO.:** West of Lewes and east of Harbeson, 8 October 2004, *Longbottom 5402* (NY); south of Dewey Beach, 5 October 2009, *Longbottom 12978* (DOV, NY); town of Fenwick Island, 2 October 2010, *Longbottom 14366* (MU, NY); town of Bethany Beach, 27 September 2010, *Longbottom 14362* (NY); along DE Rt. 20, Hardscrabble Road, 25 October 2014, *Longbottom 22066* (DOV, MARY, MO, NY, US); along DE Rt. 1, Coastal Highway, just north of the Indian River Inlet Life Saving Museum, along roadside, 27 October 2014, *Longbottom 22069* (DOV, MARY, MO, NY, US). **MARYLAND, ANNE ARUNDEL CO.:** Town of Edgewater, 6 November 2008, *Longbottom 12372* (NY, MO, US); town of Millersville, 7 October 2011, *Longbottom 16610* (MO, MU, NY, US); town of Tracy's Landing, 9 November 2011, *Longbottom 16652* (NY, US). **CAROLINE CO.:** Town of Federalsburg, 7 October 2011, *Longbottom 16612* (MO, NY, US). **CHARLES CO:** Chicamuxen, 23 September 2014, *Longbottom 21844 & Brighton* (NY). **HOWARD CO.:** Town of Columbia, 19 September 2012, *Longbottom 18289* (NY, US); town of Waterloo, 11 October 2012, *Longbottom 18385* (NY, US). **QUEEN ANNE'S CO.:** Town of Queenstown, 2 October 2009, *Longbottom 12971* (NY). **TALBOT CO.:** East of the town of Newcomb, 18 October 2008, *Longbottom 12354* (NY); town of Easton, 11 October 2011, *Longbottom 16613* (MO, MU, NY, USF). **WICOMICO CO.:** Town of Salisbury, 13 October 2011, *Longbottom 16620* (DOV, MO, MU, NY). **WORCESTER CO.:** Along MD Rt. 611, Stephen Decatur Highway, 10 October 2008, *Longbottom 12332* (NY).

Dichanthelium cryptanthum (Ashe) LeBlond

Dichanthelium cryptanthum is a rare grass native to Atlantic coastal states from New Jersey south to Florida and west to Texas (Hitchcock & Chase 1910, Weakley et al. 2011). Throughout its range, it grows in openings in swamps. The collection we cite appears to be the first for Delaware. At this site, it was infrequent and local in a sunny, wet, open, mucky area with shallow standing water in an extensive swamp. The site had no evidence of human-induced disturbance. We judge *D. cryptanthum* to be native to Delaware.

Voucher Specimen(s): U.S.A., DELAWARE, SUSSEX CO.: 1.7 mi. NNW of Millsboro, 20 July 2009, *Naczi 12587A & Bennett* (NY).

Urochloa platyphylla (Munro ex C. Wright) R.D. Webster

We are reporting this species as new to Delaware and spreading in Maryland. It was first collected in Maryland by Terrell & Reveal in 1994 in Wicomico County. They also reported it from Somerset County but did not cite a specimen (Terrell & Reveal 1996). We here supply a voucher for Somerset County. All specimens collected were growing at the edges of agricultural fields.

Voucher Specimen(s): U.S.A. DELAWARE, KENT CO.: Along Parker Road, 17 October 2014, *Longbottom 22058* (DOV, MARY, NY, US); along DE Rt. 14, 17 October 2014, *Longbottom 22059* (DOV, MARY, NY, US). **SUSSEX CO.:** Town of Atlanta, 3 October 2014, *Longbottom 22024* (DOV, MARY, NY, US); town of Georgetown, 6 October 2014, *Longbottom 22027* (DOV, MARY, NY, US); town of Oakley, 9 October 2014, *Longbottom 22036* (DOV, MARY, NY, US); Whaley's Crossroads, 30 October 2014, *Longbottom 22071* (DOV, MARY, NY, US). **MARYLAND, CAROLINE CO.:** Federalsburg, 1 October 2014, *Longbottom 22012* (DOV, MARY, NY, US); along MD Rt. 16, Greenwood Road, 9 October 2014, *Longbottom 22037* (DOV, MARY, NY, US). **DORCHESTER CO.:** Hurlock, 17 September 2011, *W. Knapp 3382* (MARY); between Cambridge and Linkwood, 3 October 2014, *Longbottom 22022* (DOV, MARY, NY, US); Vienna, 14 October 2014, *Longbottom 22052* (DOV, MARY, NY, US); MD Rt. 318, Preston Road, between Hynson Road and Hubbard Road, 15 October 2014, *Longbottom 22056* (DOV, MARY, NY, US); Rhodesdale, 23 October 2014, *Longbottom 22063* (NY, MARY); Egypt Road, 26 October 2014, *Longbottom 22068, Hollway, & Van Velsir* (DOV, MARY, NY, US). **SOMERSET CO.:** Along US Rt. 13, Ocean Highway, at Arden Station-Mennonite Church Road, 14 October 2014, *Longbottom 22053* (DOV, MARY, NY, US). **TALBOT CO.:** Along MD Rt. 33, Saint Michaels Road, 29 September 2014, *Longbottom 21987* (DOV, MARY, NY, US); along MD Rt. 33, Saint Michaels Road, 8 October 2014, *Longbottom 22034* (DOV, MARY, NY, US); town of Trappe, 14 October 2014, *Longbottom 22050* (DOV, MARY, NY, US); along US Rt. 50, Ocean Gateway, 25 October 2014, *Longbottom 22064* (DOV, MARY, MO, NY, US). **WICOMICO CO.:** N of Hebron, 27 September 2014, *Longbottom 21983* (NY); along US Rt. 50, Ocean Gateway, at Eastside Drive, 10 October 2014, *Longbottom 22038* (DOV, MARY, NY, US); Willards, 22 October 2014, *Longbottom 22061* (MARY, NY); Willards, 23 October 2014, *Longbottom 22062* (MARY, NY). **WORCESTER CO.:** Berlin, 2 October 2014, *Longbottom 22020* (DOV, MARY, NY, US); along US Rt. 50, 10 October 2014, *Longbottom 22039* (DOV, MARY, NY, US); Berlin, 16 October 2014, *Longbottom 22057* (DOV, MARY, NY, US), along MD Rt. 610, Whaleyville Road, 31 October 2014, *Longbottom 22072* (DOV, MARY, NY, US).

***Urochloa texana* (Buckley) R.D. Webster**

We are reporting this species as new to Delaware and spreading in Maryland. It was first collected in Maryland by Terrell and Reveal in 1994 (Terrell & Reveal 1996) in Dorchester County. They also reported it from Wicomico County but did not cite a specimen. (Terrell & Reveal 1996). All specimens collected were growing at the edges of agricultural fields.

Voucher Specimen(s): U.S.A., DELAWARE, KENT CO.: Along DE Rt. 14, Harrington, 11 September 2015, *Longbottom 23626* (DOV, MARY, MO, NY). **SUSSEX CO.:** Along DE Rt. 20, 29 September 2014, *Longbottom 21989* (DOV, MARY, NY, US); town of Williamsville, 4 October 2014, *Longbottom 22025* (DOV, MARY, NY, US); between Bridgeville & Georgetown, 6 October 2014, *Longbottom 22027* (DOV, MARY, NY, US); along DE Rt. 26, Vines Creek Road, 8 October 2014, *Longbottom 22035* (DOV, MARY, NY, US); Whaley's Crossroads, 30 October 2014, *Longbottom 22070* (NY). **MARYLAND, CAROLINE CO.:** Federalsburg, 3 October 2014, *Longbottom 22023* (DOV, MARY, NY, US); Jonestown, 7 October 2014, *Longbottom 22033* (DOV, MARY, NY, US); Preston, 15 October 2014, *Longbottom 22055* (DOV, MARY, NY, US). **DORCHESTER CO.:** Town of Hurlock, 30 September 2014, *Longbottom 21992 & Brighton* (DOV, MARY, NY, US). **WICOMICO CO.:** Nutters Neck Wildlife Management Area, 14 October 2008, *Longbottom 12343 & Van Velsir* (MO, NY); north of Hebron, 27 September 2014, *Longbottom 21982* (MARY, NY).

RUBIACEAE

***Cruciata pedemontana* (Bellardi) Ehrend. [*Galium pedemontanum* (Bellardi) All.]**

Cruciata pedemontana is introduced in North America, where it occurs from New York west to Illinois and Kansas, south to Georgia and Texas. It also occurs in the northwestern U.S.A., from Montana west to Washington, south to Idaho and Oregon (USDA 2015). This species is native to Europe (Gleason & Cronquist 1991).

The six collections we cite below appear to be the first for *C. pedemontana* in Delaware. We found it growing in a variety of sunny, mesic, disturbed places, such as roadsides, edges of agricultural fields, lawns, and parking lots. At most of the sites, it was frequent. Given the number of sites we discovered within 2011, it appears that *C. pedemontana* had been present in Delaware for a long time prior to our discoveries. Supporting this expectation is the presence of *C. pedemontana* in adjacent Maryland (USDA 2015). Since its distribution in Maryland is not well known, we are also reporting its apparent spread in Maryland.

Voucher Specimen(s): U.S.A., DELAWARE, KENT CO.: North of the town of Leipsic, Bombay Hook, Bear Swamp Pool, growing along roadside at edge of the impoundment, 17

May 2011, *Longbottom 14954 & Hollway, Van Velsir* (NY). **SUSSEX CO.:** 2.0 mi. NNE of Bridgeville, 21 Apr 2011, *Naczi 13422* (NY); Concord, 2 May 2011, *Longbottom 14824* (NY); Seaford, 7 May 2011, *Naczi 13631* (NY); town of Lewes, 14 May 2011, *Longbottom 14921* (NY); Laurel, 25 May 2011, *Longbottom 15029* (NY). **MARYLAND, ANNE ARUNDEL CO.:** Davidsonville, 18 May 2014, *Longbottom 20746* (MARY). **CALVERT CO.:** Town of Dunkirk, 9 June 2013, *Longbottom 19487* (NY). **CAROLINE CO.:** Idylwild Wildlife Management Area, 25 May 2009, *Longbottom 12833* (NY); Town of Preston, 12 May 2011, *Longbottom 14,899* (NY). **DORCHESTER CO.:** Between the towns of Hurlock and East New Market, 4 June 2007, *Longbottom 9131* (DOV); town of Galestown, at Galestown Millpond, along Delaware Line Road at Galestown Reliance Road, roadside waste area, 6 May 2014, *Longbottom 20644* (MARY, NY). **HOWARD CO.:** Town of Jessup, 21 May 2014, *Longbottom 20774* (MARY); Annapolis Junction, 24 May 2014, *Longbottom 20790* (MARY).

SOLANACEAE

Physalis angulata L.

This species is new for Maryland. This species is native to tropical America north to southeast Virginia (Gleason & Cronquist 1991). We found it in a waste area along a roadside. We consider it to be non-native in Maryland.

Voucher Specimen(s): U.S.A., MARYLAND, CAROLINE CO: North of the town of Harmony, 27 November 2010, *Longbottom 14585* (MARY, NY).

VIOLACEAE

Viola esculenta Elliot

This is the first attribution of this southern swamp violet to Maryland. *Viola esculenta* ranges from southeastern Virginia south to northern peninsular Florida and west to eastern Texas (Weakley 2015 [as *V. edulis* Spach]). It is abundant in the forested swamps of the Pocomoke River and associated with many other rare species nearing their northern limit of geographic distribution.

Voucher Specimen(s): U.S.A., MARYLAND WORCESTER CO.: Purnell Pond, town of Snow Hill, 29 June 2012, *Knapp 3940 & R. Wilson* (TAWES); NE of the town of Snow Hill S of Porters Crossing Road W side of Pocomoke River, 17 October 2012, *Knapp 4221, K. Conrad, & M. Fisher* (TAWES).

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Flora of Burden Hill Forest: a Checklist for a Salem County, New Jersey Landscape

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ABSTRACT. We provide a checklist of native and non-native plants growing within a region of Salem County described as Burden Hill Forest. This list is the result of more than a dozen surveys that we conducted between 2001 and 2012. 530 distinct taxa (106 families, 303 genera, 520 species, and 10 varieties) were identified within the forests and meadows found between the villages of Alloway and Stow Creek. Included are habitat descriptions and site locations for plants of special interest. A landscape description is provided that distinguishes this forest and its flora from other New Jersey Outer Coastal Plain forests.

INTRODUCTION

Salem County, New Jersey is not a region one thinks of as supporting large contiguous forests. Cleared and farmed since the late 1600s (Smith 1877), Salem County is best known for vistas of bucolic fields and expansive tidal marshes. Early colonial farmers learned that the soils between the Delaware River and Delaware Bay were excellent for crops and livestock. Soon after the Finns, Swedes, and English gained a foothold, the county's forests yielded to the progress of the ax and stock animals, "*Their lands and meadows are rich, and production of any kind, natural to the climate, plenty*" (Smith 1877).

Few forests survived the initial clearing, resulting in a landscape that was mapped by the 1880s without any woodland larger than 50 acres (Vermeule 1884, 1900). There is, however, a segment of the county that time and the plow have passed by, where a significant fragment of an original forest persists. While not comprised of virgin timber, this fragment, underlain by less productive soils, has been perpetuated as woodlot. Subjected to repeated cutting since settlement, these parcels were allowed by design to regenerate forest. Collectively this forested landscape has long been known locally as the "Barrens" (Thomas Gordon 1834), or the "Alloway/Quinton Barrens" (USDA 1969), the same area that we today call the Burden Hill Forest.

Thomas Gordon (1834) provided us with an early glimpse of the Burden Hill landscape, where forestry was a major historic occupation. He described the forest providing, "much white oak and pinewood for the market, which finds its way to Philadelphia by Alloways creek." This 19th century Burden Hill Forest description cited a wide range of soils in Alloway Township. It described stiff clay north of Allowaytown, whereas it was sand and gravel south of the village. Vermeule (1900) described the land southeast of Alloway as an area, "well mixed with conifer, although oaks predominate." He described Burden Hill as a habitat richer than land east of Williamstown yet not as productive as the

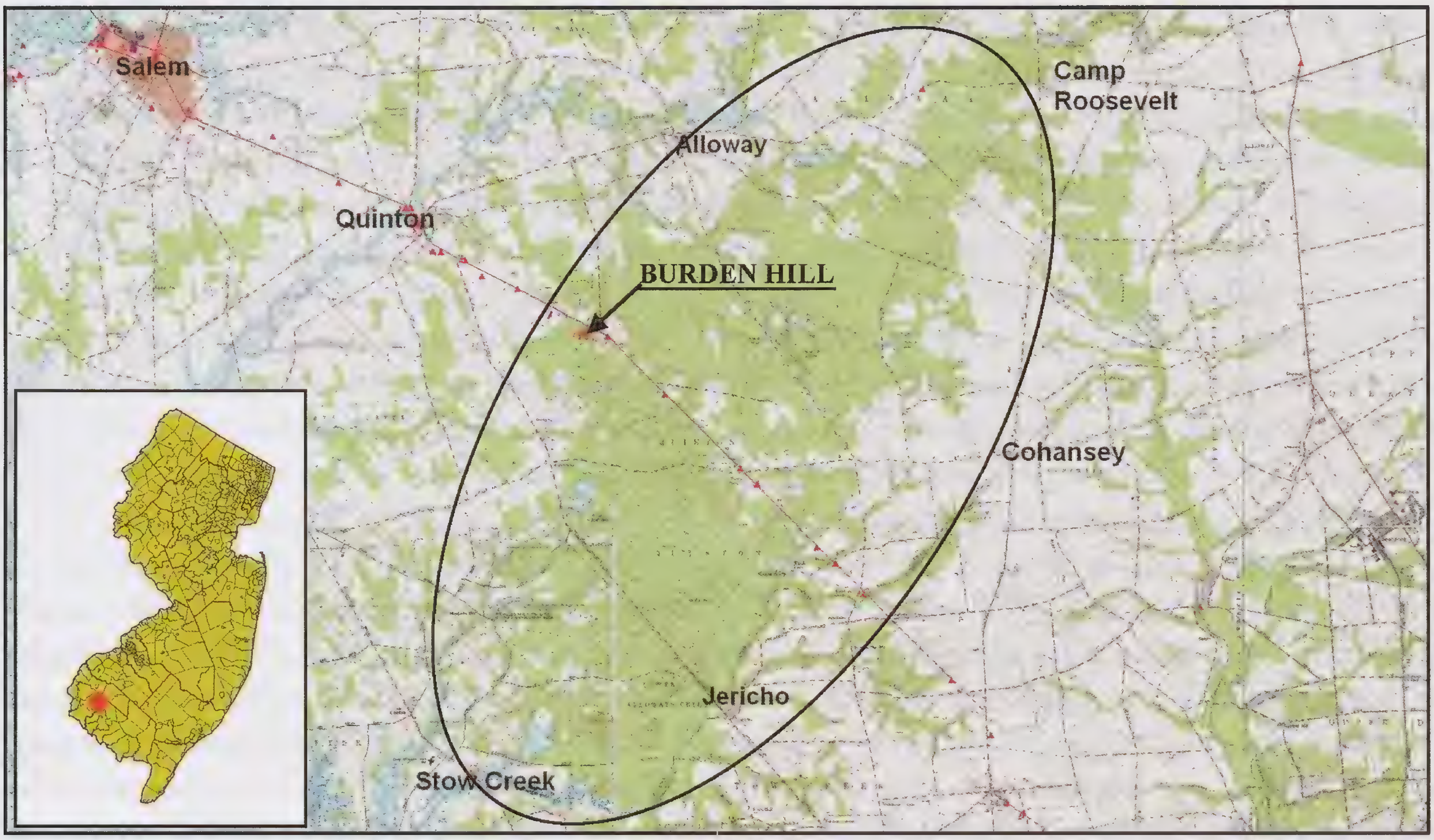

Figure 1. Burden Hill Forest on USGS mosaic; contiguous green represents the existing forest. The mount is shown on the Alloway, NJ USGS Topographic Quadrangle as the benchmark "Burden." The forest spreads across three townships: Alloway, Lower Alloways Creek, and Quinton. A small portion of the forest enters Stow Creek Township, Cumberland County, near the village of Jericho. The Burden Hill landscape roughly corresponds to the region between the village of Alloway near its northwestern boundary and Camp Roosevelt at its northeastern extent (BSA camp 0.5 miles north of Watson Corners) and the stream Stow Creek at the southern edge of the forest. It roughly extends between the villages of Quinton to the west and Cohansey to the east.

"extensive deciduous timber which surrounds it." Clearly, the forest that escaped the initial and permanent colonial period clearing existed on a sand and gravel landscape south of Allowaytown, i.e., the Burden Hill Forest.

The Burden Hill Forest occupies about 14,000 acres of New Jersey's southwestern Outer Coastal Plain primarily in Salem County. It is named after a 135' high mount known as Burden Hill.

The Burden Hill Forest covers the southern tip of New Jersey's cuesta, which forms the boundary between the Inner and Outer Coastal Plains. A homoclinal ridge is another name for this boundary. The term defines a landscape elevation exhibiting a gradual cline that transitions to a steep escarpment (Simonett 1968). New Jersey's Coastal Plain cuesta is a distinctive series of hillocks that follow the western edge of the Cohansey Formation, where the thinning layer of Miocene sand ends and the finer textured earlier formations begin. The cuesta begins in Monmouth County and ends in the Burden Hill Forest region. The Burden Hill hillocks are covered with caps of Pennsauken and Bridgeton gravel (Arkos I and II). These caps provide erosion protection that has resulted in hilly terrain. Erosion on the edge of the Cohansey Formation over millions of years has created the named ridges visible at Roosevelt, Arny's Mount, Mount Holly, Mount Laurel, Red Man's Hill, Pine Hill, Blackwood, Mullica Hill, Big Mannington Hill, Burden Hill, and Coffin Hill. Outlier mounts such as Pine Mount and a few unnamed hills exist south along the Delaware Bay, where similar geology occurs. The geologic intersection of the Cohansey Formation over earlier deposits has created a landscape where well-drained uplands transition into fine sands and eventually loam and clay soils. This transition has formed slopes that feed headwater springs and deeply incised streams with ripple and pool streambed structure.

Landscapes with comparable geologic and topographic circumstances exist along the geologic boundary between the Inner and Outer Coastal Plains. Examples exist in the Big Timber, Mantua, Raccoon, and Oldmans Creek watersheds. Most of these similar landscapes are currently occupied by agricultural, industrial or residential uses. Fragments of similar forest and landscape once occurred between Pine Hill and Blackwood in Camden County, and Aura and Ewan in Gloucester County. However, both of these areas today are highly fragmented by agriculture and reduced to minor tracts of forest cover.

The Burden Hill Forest is an anomaly, primarily due to its long distance to major transportation corridors. This area continues to support a large, contiguous forest at the southern end of the geologic and physiographic boundary between the Inner and Outer Coastal Plains. Today's forest straddles a boundary between tertiary and cretaceous geologic formations. The change between the Cohansey sand to the east and the Vincentown marl to the west of the boundary is a demonstrable transition. Within a span of three miles, the sand and gravel surface changes to fine silt and clay. This textural gradient provides growing mediums with a suite of unique textures in unique niches that are suitable for a variety of upland and wetland plant communities and their constituent species.

The Cohansey Formation in the Burden Hill region is at its geographical southwestern terminus. It is also at its thinnest deposit (0-50') and has the finest texture (Rhodehamel 1979). This thin layer of finer delta deposits is overlain and intermixed with surface deposited Bridgeton and Pennsauken gravel. The gravel caps are ancient Pliocene and Pleistocene turbulent river deposits with a matrix that incorporates a measurable percentage of silt and clay particles. Nowhere within the forest are characteristic Outer Coastal Plain landscape features, such as extensive windblown dunes, wide fluvial outflows, and broad areas of peri-glacial patterned ground so typical of interior lowland landscapes of the Pine Barrens (Newell et al. 1998). This western edge of the Outer Coastal Plain, with its finer textured soils and distinct surface geology, creates a steep-sloped topography dissimilar to most other Outer Coastal Plain landforms. It is on this unique geologic remnant that the Burden Hill Forest developed.

The finer textured substrates at the forest's northern boundary transition to the more coarsely textured soils near Stow Creek at the southern edge of the forest (USDA 1969). Toward the north, Downer, Woodstown, and Sassafras soils exist. Evesboro, Galestown, and Fort Mott soils are sandy substrates found at the southern end of the forest. The fine textured soils at the north end of this region have a higher concentration of silt and clay that provides higher soil moisture. This finer texture also provides added nutrient retention by physical and chemical adhesion, making these soils slightly richer than the coarser and sandier textured soils found at the south end of the forest.

FLORA SURVEY METHODS

The lack of botanical information on the Burden Hill Forest prompted our field investigations and the writing of this paper. The flora list is the product of more than a dozen field surveys conducted between 2001 and 2012. Survey lists from fifty-nine (59) parcels provided the data for this paper. The survey encompassed approximately 1,876 acres (13.4% of the forest) using a random survey methodology. Property investigations occurred on land owned by the Natural Lands Trust (NLT), New Jersey Conservation Foundation, the State of New Jersey, and private citizens. Forty-six man-days (8 hours/ person) spaced over twelve growing seasons allowed for repeat inspections. The parcel surveys were augmented with additional data obtained during Philadelphia Botanical Club (PBC) field trips made in 2004 (Arsenault 2006) and in 2006, 2008, 2011, and 2012 (Gordon and Arsenault 2006, 2009, 2011, 2013, 2015, respectively). Each parcel was inspected on foot by walking road edges, existing interior sand roads, and footpaths. More often, surveys were conducted along random transects. The authors anticipate that their species checklist will serve as a starting point for future botanical investigations of the area.

Taxonomy of families reflects the authorities of the Angiosperm Phylogeny Group (2015 edition). For genera and species classifications, the authors used multiple authorities from among the following: Flora of North America (1993+), Weakley (2012), USDA PLANTS Database (USDA, NRCS 2015), and Kartesz and Meacham (1999). Nomenclature approved by the Flora of New Jersey Project (2015) applies to a limited set of taxa proposed for their ongoing botanical project.

RESULTS

THE FLORA OF BURDEN HILL FOREST

The flora of the Burden Hill Forest includes many species quite common on the sandy-loam soils of New Jersey's southwestern Coastal Plain. The surveys record 530 taxa comprised of 106 families, 303 genera, 520 species, and 10 varieties (See Appendix 1: Burden Hill Forest Checklist). Many of these taxa have an affinity with the flora found on rich substrates. The richer soils support numerous plants that do not occur in the Pine Barrens. Species such as *Euonymus americanus* (strawberry bush) *Eupatorium* (*Eutrochium*) *fistulosum* (hollow-stem Joe-pye-weed), *Sanicula marilandica* (black snakeroot), *Arisaema triphyllum* (Jack-in-the-pulpit), *Doellingeria umbellata* (tall flat-topped white aster), and *Rhododendron periclymenoides* (pinxterflower) are among those species that have ecological links to the Delaware River Valley flora. Thus, these data confirm an affinity toward the Inner Coastal Plain flora, but a separate type that was once expansive on the Outer Coastal Plain. Stone (1911) listed 167 species as characteristic of the "*Middle District*," a term he used to refer to "*that portion of the coastal plain which lies west and north of the Pine Barrens reaching around the bayshore to Dennisville.*" The Burden Hill Forest survey included 67 of these Middle District plants, or 40% of Stone's total. Conversely, of the 175 species Stone (1911) listed as characteristic Pine Barrens plants, only 23 were observed—less than 6% of the flora. The Burden Hill Forest supports no Pine Barren endemic species. The region does share many similarities with other Outer Coastal Plain forests. Stone (1911) lists 197 species common to both the Pine Barrens and Middle District. Burden Hill supports 161 or 82% of the overlapping species. Only a few of those species, about 16% of the plants we recorded in the Burden Hill area, are non-native, and only a few have penetrated the interior of the forest. Approximately 90% of the non-native species recorded are herbs restricted to road edges, rights-of-way, farm fields, and plantations as a result of anthropogenic disturbances (roadside filling, scraping, clearing, planting).

The Burden Hill Forest flora includes species that have broad regional distribution, and few plants are restricted to this corner of New Jersey. For example, the Burden Hill Forest includes 11 oak species and 2 hybrids. This represents 50% of the state's oak species. Most common are *Quercus alba* (white oak), *Quercus velutina* (black oak), and *Quercus coccinea* (scarlet oak). *Fagus grandifolia* (American beech), a species occurring mostly on the Inner Coastal Plain and the northern physiographic provinces, is also present in the Burden Hill canopy. In addition there are basal sprouts of *Castanea dentata* (American chestnut). The persistence of these two species indicates that fire is not a controlling ecosystem stressor here as it is in the Pine Barrens. *Quercus montana* (chestnut oak), *Quercus rubra* (northern red oak), *Quercus falcata* (southern red oak), *Quercus marilandica* (blackjack oak), and *Quercus stellata* (post oak) are also represented in the Burden Hill Forest canopy. The flora includes two putative oak hybrids, both well distributed in southern New Jersey. *Quercus ×saulii* (*Q. alba* × *Q. montana*; Saul's Oak) and *Q. ×ludoviciana* (*Q. falcata* × *Q. phellos*), are present within intermingled oak-dominated canopies. A large specimen of Saul's Oak of statewide notoriety occurs within an NLT property. The canopy also includes three fire intolerant hickories: *Carya tomentosa* (mockernut), *Carya pallida* (sand hickory), and *Carya glabra* (pignut hickory).

The Burden Hill understory is often distinctive. Many upland forests on the Coastal Plain have an understory dominated by *Gaylussacia baccata* (black huckleberry). However, in the Burden Hill Forest, *Gaylussacia frondosa* (dangleberry), is the major understory shrub, often to the total exclusion of *G. baccata*. Another distinction that differentiates the Burden Hill Forest is the near absence of *Quercus ilicifolia* (scrub oak). In contrast, this small tree, common on sandy soil throughout the State and especially abundant in the Pine Barrens, is here replaced by *Castanea pumila* (chinquapin). Chinquapin is a very rare colonial shrub that is frequent in the Burden Hill thickets where it is associated with exceptionally tall specimens of *Kalmia latifolia* (mountain laurel).

Plants of Special Interest

A short description of plants with a listed status along with comments on their location and habitat provides notoriety to seventeen species. Abbreviations include state rarity designations as applied by the Office of Natural Lands Management, Natural Heritage Program- S1, S2, S3 (New Jersey Natural Heritage Program; Snyder 2013); Endangered Plant Species List Act (1989)-E; Federal listings – L, rank threatened – T.

***Amelanchier spicata* (Lam.) K. Koch (=*A. stolonifera* Wiegand); Dwarf Shadbush or Running Shadbush (S3):** This shadbush is a colonial shrub found in dry upland roadsides and forest openings. The Burden Hill Forest population occurs in the northeastern corner, along Telegraph Road forest edges.

***Amianthium muscitoxicum* (Walter) A. Gray; Fly Poison (S2):** *Amianthium muscitoxicum* is a lily that occurs scattered in at least three separate populations within the Deep Run and Cool Run wetlands. Here it occurs in saturated soils above seeps under canopies of *Acer rubrum* (red maple) and *Liquidambar styraciflua* (sweet gum). At times it is associated with *Helonias bullata*, *Listera australis* (southern twayblade), and *Veratrum virginicum* (Virginia bunchflower), although it prefers less saturated conditions on slightly higher terraces. The Burden Hill populations do not seem to flower regularly and plants are identified primarily by their characteristic clusters of long basal leaves. The lily was observed in flower only once during site visits. The species is found in a few other Coastal Plain communities of southern New Jersey, including the Pine Barrens, and where it is found it is often vulnerable to suburban impacts (Arsenault and Gordon, personal observations in Gloucester and Burlington Counties).

***Aristolochia serpentaria* L. [=*Endodeca serpentaria* (L.) Raf.]; Virginia Snakeroot (S3):** A colony of this species was discovered in rich woodland during a PBC field trip to Elkington Mill Pond. Widely scattered plants occupied the edge of a dirt road through a pine plantation. The plants were on rich, moist loam mixed with a variety of plants such as *Microstegium vimineum* (Nepalese stilt-grass), *Ophioglossum pycnostichum* (southern adder's tongue) and *Prunella vulgaris* (heal-all). Stone (1911) identified twelve known populations between Keyport, Monmouth Co., and Cold Springs, Cape May Co. The Elkington Mill Pond population is the only extant station currently known for Salem County (Snyder, personal communication).

***Castanea pumila* (L.) Mill.; Chinquapin (S1, E):** *C. pumila* is more abundant in the Burden Hill Forest than its larger relative the *Castanea americana*. This endangered shrub forms thickets with Mountain Laurel throughout Burden Hill's oak forests, but is especially abundant in the forest's northeastern corner and is found on both sides of Telegraph Road north of Cool Run Road. It occupies a position here analogous to the role of *Quercus ilicifolia* (scrub oak) in the Pine Barrens. The plant forms dense patches in uplands west of Telegraph Road, but individual plants are found widely distributed throughout the greater Burden Hill region, often, in our experience in Burden Hill Forest, on Downer sandy loam. Like the *C. americana*, *C. pumila* is susceptible to the chestnut blight fungus, *Cryphonectria parasitica*, formerly *Endothia parasitica* (Peine 1998; Paillet 1993). Our field observations have confirmed that *C. pumila*, unlike *C. americana*, regularly flowers and sets fertile seed. The presence of younger specimens attests to the viability of the seed and the plant's ability to persist in the presence of the blight fungus.

***Chionanthus virginicus* L.; Fringe Tree (S3):** A small sub-canopy understory tree, Fringe Tree is a southern species that reaches its northern limit in New Jersey in the wetlands of Salem and Cumberland Counties (Hough 1983). In the Burden Hill Forest the tree often occupies the same wetlands supporting *Helonias bullata*, specifically in the Coopers Run, Alloway Creek, and the headwater tributaries of Stow Creek.

***Dichanthelium aciculare* (Desv. ex Poir.) Gould & C.A. Clark; Needle-leaf Panic Grass or Bristling Rosette Panic Grass (SH, E):** A single colony of this distinctive rosette panic grass was discovered on an NLT property near an abandoned home site northwest of Pecks Corner. It occupied xeric sandy woodland beneath an eastern red cedar, common persimmon, and sassafras canopy. The taxon was once known from a few collections in Cape May County (Hough 1983; *O. Brown and W. Witte s.n.*, 1932, Fishing Creek, Cape May, CHRB#62953). Apparently, suitable habitat exists throughout the Coastal Plain of southwestern New Jersey (Arsenault, personal observation). The recent discovery of this population suggests that more extensive searching is needed to determine the status of this grass.

***Helonias bullata* L.; Swamp-pink (S3, LT, E):** *Helonias bullata* is a globally rare, yet well-known native lily. New Jersey supports most of the nation's populations of *H. bullata* (USFWS 2008), and the Burden Hill Forest supports a few of the state's largest (Arsenault, personal observations). *H. bullata* prefers wetland seeps, most often in red maple-black gum swamps. Its survival is dependent on a stable hydrology, since the plant cannot tolerate extended periods of desiccation or prolonged flooding (USFWS 1991). It also grows on hummocks and at the bases of shrubs and trees within Atlantic white cedar forests. Burden Hill's populations occur in the Alloway Creek and Stow Creek headwaters in association with *Carex folliculata, Symplocarpus foetidus*, *Listera australis*, and *Lilium superbum*.

***Listera australis* Lindl.; Southern Twayblade (S3):** This diminutive orchid is an elusive species. Less than two decades ago, it was considered to be extremely rare in the state (Snyder, personal communications). We found additional populations in many southern New Jersey red maple wetlands where sphagnum carpets provide a suitable substrate for the plant's delicate fibrous roots (Arsenault and Gordon, personal observations). Of the three populations we found in Burden Hill Forest, two were in the Deep Run watershed. A third occurred on the wetland terraces bordering the headwater tributaries of Stow Creek.

***Ophioglossum pusillum* Raf. [=*O. vulgatum* L. var. *pseudopodum* (S.F. Blake) Farw.]; Northern Adder's-tongue (S3):** *Ophioglossum pusillum* is widespread in New Jersey but never common. Southwest of Elkington Mill Pond on the northwestern edge of the forest, a single population occurs on a rich loam in a mixed conifer-hardwood plantation under *Liquidambar styraciflua*, *Acer rubrum*, and *Liriodendron tulipifera*.

***Ophioglossum pycnostichum* (Fernald) A. Löve & D. Löve [=*O. vulgatum* L. var. *pycnostichum*) Fernald]; Southern Adder's-tongue (S1, E):** The endangered *Ophioglossum pycnostichum* occurs in the same plantation as its more common relative above. It differs primarily from *O. pusillum* in having a dark, persistent, leathery, tubular basal sheath attached just above the root collar well beneath the ground surface. The population is scattered along a road edge with *Aristolochia serpentaria*, *Galium aparine*, *Dendrolycopodium obscurum*, *Goodyera pubescens*, and *Luzula multiflora*. The two adder's-tongue stations are in close proximity, but their populations do not overlap. The northern species occupies the forest floor, whereas the southern species is growing primarily in the hard-packed center of an access dirt road underlain by loam.

***Pinus taeda* L.; Loblolly Pine (S2):** This pine is restricted in New Jersey to the Delaware Bay region of the three southernmost counties (Hough 1983). The specimens observed in the Burden Hill Forest were planted with *Pinus strobus*, *Pinus sylvestris*, and other ornamental species.

***Polygala polygama* Walt.; Racemed Milkwort (S2):** Once more common in the upper part of the Middle District and in the northern counties, *P. polygama* is now scarce (Arsenault and Gordon, personal observations; Snyder, personal communications). This biennial milkwort grows on sparsely vegetated, dry soil frequently disturbed by man. A small population, one of few known for Salem County, was discovered during a PBC field trip on dry silt soil of an exposed road bank under a power line right-of-way, west of Telegraph Road, in the Thundergust Pond Wildlife Management Area (WMA).

***Stylosanthes biflora* (L.) Britton, Sterns, & Poggenb.; Pencilflower (S3):** A population of this pea exists in close proximity to the *Polygala polygama* population in the WMA. This plant was seen during a PBC field trip.

***Toxicodendron pubescens* Mill.; Poison Oak (S3):** *Toxicodendron pubescens* is a globally stable shrub with an eastern distribution into New Jersey. Populations occur throughout Cumberland and Salem Counties on dry roadsides and open fields. Burden Hill plants are found on dry roadsides with populations near Shepp's Mill and Gravelly Hill, in the Stow Creek watershed.

***Veratrum virginicum* (L.) W.T. Aiton (=*Melanthium virginicum* L.); Virginia Bunchflower (S1, E):** *Veratrum virginicum* is one of New Jersey's rarest plants. Like *Helonias bullata* and *Amianthium muscitoxicum*, it is a wetland lily. Although ranked as globally secure, it is only known in New Jersey from a handful of sites (Snyder, personal communications). The plant's architecture and leaf form is similar to that of *A. muscitoxicum*, but its flower is unmistakably different from the smaller, more compact flower of the latter. The flower stalk of *V. virginicum* approaches 1.5 m, branching into an open panicle of small, white, 3-parted flowers. The fruit is a 3-parted capsule that dangles from a large flowering stalk. To date, one small population has been discovered in a peri-glacial depression within Deep Run watershed. The plant occupies sphagnum hummocks under *Viburnum nudum* with *Carex folliculata*, *Carex collinsii*, *Symplocarpus foetidus*, and *Woodwardia areolata*.

***Viola brittoniana* Pollard; Britton's Violet, Coast Violet (S3):** Approximately 100 meters north of the *Polygala polygama* population in the WMA, a scattered colony of *Viola brittoniana* was discovered in a perennially wet meadow also within the power line right-of-way. Considerable leaf variability was noted and it is quite possible that specimens of the so called rare *V. brittoniana* var. *pectinata* (SH), Cut-leaf Coast Violet, recognized by some authors, were present.

***Utricularia purpurea* Walt.; Purple Bladderwort (S3):** *Utricularia purpurea* thrives in aquatic habitats associated with still, sluggish or slow moving water beneath open canopies. Among these habitats, scarce or absent in the Burden Hill Forest, are on-stream ponds, old ox-bow meanders or back-coves, abandoned gravel excavations, intermittent basins, and cranberry bog canals. On a 2007 PBC field trip, a robust colony of *U. purpurea* was discovered in a flooded depression under a power line right-of-way in the WMA.

APPENDIX 1

BURDEN HILL FOREST
CHECKLIST

(* indicates plants non-native to the flora)

LYCOPODIALES

LYCOPODIACEAE (Clubmoss Family)

Dendrolycopodium obscurum (L.) A. Haines (=*Lycopodium obscurum* L.); Common Tree Clubmoss

Diphasiastrum digitatum (Dill. ex A. Braun) Holub (=*Lycopodium digitatum* Dill. ex A. Braun); Common Running-cedar

Huperzia lucidula (Michx.) Trevis. (=*Lycopodium lucidulum* Michx.); Shining Clubmoss

Lycopodium clavatum L.; Staghorn Clubmoss

ASPLENIACEAE (Spleenwort Family)

Asplenium platyneuron (L.) Britton, Sterns, & Poggenb.; Ebony Spleenwort

BLECHNACEAE (Chain Fern Family)

Woodwardia areolata (L.) T. Moore; Netted Chain Fern

Woodwardia virginica (L.) J. E. Smith; Virginia Chain Fern

DENNSTAEDTIACEAE (Bracken Family)

Dennstaedtia punctilobula (Michx.) T. Moore; Hay-scented Fern

Pteridium aquilinum (L.) Kuhn subsp. *latiusculum* (Desv.) Hultén; Eastern Bracken Fern

DRYOPTERIDACEAE (Wood Fern Family)

Dryopteris carthusiana (Villars) H. P. Fuchs; Spinulose Wood Fern

Polystichum acrostichoides (Michx.) Schott; Christmas Fern

EQUISETACEAE (Horsetail Family)

Equisetum arvense L.; Field Horsetail

ONOCLEACEAE (Sensitive Fern Family)

Onoclea sensibilis L.; Sensitive Fern

OPHIOGLOSSACEAE (Adder's-tongue Family)

Botrychium dissectum Spreng.; Cut-leaved Grape Fern

Botrychium virginianum (L.) Sw. (=*Botrypus virginianus* (L.) Holub); Rattlesnake Fern

Ophioglossum pusillum Raf. [=*O. vulgatum* L. var. *pseudopodum* (Blake) Farwell]; Northern Adder's-tongue **(S3)**

Ophioglossum pycnostichum (Fernald) Á. Löve & D. Löve (=*O. vulgatum* L. var. *pycnostichum* Fernald); Southern Adder's-tongue **(S1)**

OSMUNDACEAE (Royal Fern Family)

Osmunda cinnamomea L. [=*Osmundastrum cinnamomeum* (L.) C. Presl]; Cinnamon Fern
Osmunda regalis L.; Royal Fern

THELYPTERIDACEAE (Marsh Fern Family)

Thelypteris noveboracensis (L.) Nieuwl.; New York Fern
Thelypteris palustris Schott var. *pubescens* (G. Lawson) Fernald; Marsh Fern

GYMNOSPERMS

CUPRESSACEAE (Cypress Family)

Chamaecyparis thyoides (L.) Britton, Sterns, & Poggenb.; Atlantic White-cedar
Juniperus virginiana L. var. *virginiana*; Eastern Red Cedar, Juniper

PINACEAE (Pine Family)

**Picea abies* (L.) Karst.; Norway Spruce
Pinus echinata Mill.; Shortleaf Pine
Pinus rigida Mill.; Pitch Pine
**Pinus strobus* L.; Eastern White Pine
**Pinus sylvestris* L.; Scotch Pine
Pinus taeda L.; Loblolly Pine **(S2)**, planted
Pinus virginiana Mill.; Virginia Pine

ANGIOSPERMS

DICOTYLEDONS

ADOXACEAE (Moschatel Family)

Sambucus canadensis L.; Common Elderberry
Viburnum dentatum L. var. *dentatum*; Arrow-wood
Viburnum cassinoides L. (=*V. nudum* L. var *cassinoides* (L.) Torr. & A. Gray); Withe-rod
Viburnum nudum L. (=*V. nudum* L. var. *nudum*); Possum-haw
Viburnum prunifolium L.; Black Haw

ALTINGIACEAE (Sweetgum Family)

Liquidambar styraciflua L.; Sweetgum

AMARANTHACEAE (Amaranth Family)

Froelichia gracilis (Hook.) Moq.; Slender Cottonweed

ANACARDIACEAE (Cashew Family)

Rhus copallinum L.; Winged Sumac
Toxicodendron pubescens Mill.; Poison Oak **(S3)**
Toxicodendron radicans (L.) Kuntze (=*Rhus radicans* L.); Poison Ivy
Toxicodendron vernix (L.) Kuntze (=*Rhus vernix* L.); Poison Sumac

APIACEAE (UMBELLIFERAE) (Carrot or Parsley Family)
**Daucus carota* L.; Queen-Anne's Lace
Oxypolis rigidior (L.) Raf.; Cowbane
Sanicula marilandica L.; Sanicle

APOCYNACEAE (Dogbane Family)
Apocynum cannabinum L.; Indian Hemp
Asclepias amplexicaulis J.E. Smith; Clasping Milkweed
Asclepias incarnata L. var. *pulchra* (Ehrh. ex Willd.) Pers.; Swamp Milkweed
Asclepias syriaca L.; Common Milkweed
**Vinca minor* L.; Periwinkle

AQUIFOLIACEAE (Holly Family)
Ilex glabra (L.) A. Gray; Inkberry
Ilex laevigata (Pursh) A. Gray; Smooth Winterberry
Ilex opaca Aiton; American Holly
Ilex verticillata (L.) A. Gray; Winterberry

ARALIACEAE (Ginseng Family)
Aralia nudicaulis L.; Wild Sarsaparilla
**Hedera helix* L.; English Ivy

ARISTOLOCHIACEAE (Bithwort Family)
Aristolochia serpentaria L. [=*Endodeca serpentaria* (L.) Raf.]; Virginia Snakeroot **(S3)**

ASTERACEAE (COMPOSITAE) (Aster or Sunflower Family)
Achillea millefolium L.; Common Yarrow
Ambrosia artemisiifolia L.; Common Ragweed
Antennaria plantaginifolia (L.) Richardson; Plantain-leaved Pussytoes
**Artemisia vulgaris* L.; Common Mugwort
Baccharis halimifolia L.; High-tide Bush, Groundsel Tree
Bidens bipinnata L.; Spanish Needles
**Centaurea stoebe* L. subsp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (=*C. biebersteinii* DC.); Spotted Knapweed
**Chondrilla juncea* L.; Skeleton-weed
Chrysopsis mariana (L.) Elliott; Maryland Golden-aster
**Cichorium intybus* L.; Chicory
**Cirsium arvense* L.; Canada Thistle
Cirsium discolor (Muhl. ex Willd.) Spreng.; Field Thistle
Conyza canadensis (L.) Cronquist var. *canadensis*; Horseweed
Doellingeria umbellata (Mill.) Nees; Tall Flat-topped White Aster
Erechtites hieraciifolius (L.) Raf. ex DC; Fireweed, Pilewort
Erigeron strigosus Muhl. ex Willd.; Daisy Fleabane
Eupatorium hyssopifolium L.; Hyssop-leaf Thoroughwort
Eupatorium pilosum Walter; Rough Boneset

Eupatorium rotundifolium var. *cordigerum* Fernald (=*E. cordigerum* (Fernald) Fernald); Clasping Round-leaf Thoroughwort
Eupatorium rotundifolium var. *ovatum* (Bigelow) Torr. (=*E. pubescens* Muhl. ex Willd.); Hairy Thoroughwort
Eupatorium serotinum Michx.; Late Thoroughwort
Eurybia spectabilis (Aiton) Nesom; Eastern Showy Aster
Euthamia graminifolia (L.) Nutt.; Grass-leaved Goldenrod
Eutrochium fistulosum (Barratt) E.E. Lamont; Hollow Joe-pye-weed
Eutrochium maculatum (L.) E.E. Lamont var. *maculatum* (=*Eupatorium maculatum* L. var. *maculatum*); Spotted Joe-pye-weed
**Galinsoga parviflora* Cav.; Small-flower Quickweed
Gamochaeta purpurea (L.) Cabrera (=*Gnaphalium purpureum* L.); Purple Cudweed
Heterotheca subaxillaris (Lam.) Britton & Rusby; Camphorweed
**Hieracium caespitosum* Dumort.; Yellow Kingdevil
Hieracium gronovii L.; Hairy Hawkweed
**Hieracium pilosella* L.; Mouse-ear Hawkweed
Hieracium venosum L.; Rattlesnake Weed
**Hypochaeris radicata* L.; Spotted Cat's-ear
Ionactis linariifolius(L.) Greene; Stiff-leaved Aster
Krigia virginica (L.) Willd.; Virginia Dwarf-dandelion
Lactuca canadensis L.; Wild Lettuce
**Leucanthemum vulgare* Lam.; Ox-eye Daisy
Mikania scandens (L.) Willd.; Climbing Hempweed
Nabalus serpentarius (Pursh) Hook. (=*Prenanthes serpentaria* Pursh); Lion's Foot
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt; Sweet Everlasting
Rudbeckia hirta L.; Black-eyed Susan
Sericocarpus asteroides (L.) Britton, Sterns, & Poggenb. (=*Aster paternus* Cronquist); Toothed White-top Aster
Solidago altissima L. subsp. *altissima* (=*S. canadensis* L. var. *scabra* Torr. & Gray); Tall Goldenrod
Solidago erecta Pursh; Erect Goldenrod, Slender Goldenrod
Solidago juncea Aiton; Early Goldenrod
Solidago nemoralis Aiton; Gray Goldenrod
Solidago odora Aiton; Sweet Goldenrod
Solidago puberula Nutt. var. *puberula*; Downy Goldenrod
Solidago rugosa Mill.; Rough-stemmed Goldenrod, Wrinkle-leaf Goldenrod
Solidago uliginosa Nutt.; Bog Goldenrod
Symphyotrichum dumosum (L.) Nesom *var. dumosum*; Bushy Aster
Symphyotrichum lateriflorum (L.) Á. Löve & D. Löve; Calico Aster, Starved Aster
Symphyotrichum novi-belgii (L.) Nesom; New York Aster
Symphyotrichum pilosum (Willd.) Nesom var. *pilosum*; White Old-field Aster
Symphyotrichum racemosum (Elliott) Nesom; Small White Aster
**Taraxacum officinalis* G.H.Weber ex Wiggers; Common Dandelion
Vernonia noveboracensis (L.) Michx.; New York Ironweed
Xanthium strumarium L.; Common Cocklebur

BALSAMINACEAE (Touch-me-not Family)
Impatiens capensis Meerb.; Spotted Jewelweed

BERBERIDACEAE (Barberry Family)
**Berberis thunbergii* A. DC.; Japanese Barberry

BETULACEAE (Birch Family)
Alnus serrulata (Aiton) Willd.; Smooth Alder
Betula populifolia Marshall; Gray Birch
Carpinus caroliniana Walter; Musclewood; Ironwood
Corylus americana Walter; American Hazelnut

BIGNONIACEAE (Bignonia Family)
Campsis radicans (L.) Seem. ex Bureau; Trumpet-creeper
**Catalpa speciosa* (Warder) Warder ex Englem.; Northern Catalpa

BRASSICACEAE (CRUCIFERAE) (Mustard Family)
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz subsp. *lyrata*; Lyre-leaf Rock Cress
**Arabidopsis thaliana* (L.) Heynh.; Mouse-ear Cress
**Barbarea vulgaris* W.T. Aiton.; Common Winter Cress, Yellow Rocket
**Brassica nigra* (L.) W.D.J. Koch; Black Mustard
**Cardamine hirsuta* L.; Hairy Bittercress
Cardamine parviflora L. var. *arenicola* (Britton) O.E. Schulz; Small-flowered Bittercress
**Draba verna* L.; Whitlow-grass
Lepidium virginicum L.; Virginia Peppergrass
**Sisymbrium altissimum* L.; Tall Tumble Mustard

CABOMBACEAE (Water Shield Family)
Brasenia schreberi J.F. Gmel.; Water Shield

CACTACEAE (Cactus Family)
Opuntia humifusa (Raf.) Raf. var. *humifusa*; Eastern Prickly-pear

CAMPANULACEAE (Bellwort Family)
Lobelia cardinalis L.; Cardinal Flower
Lobelia inflata L.; Indian Tobacco
Lobelia nuttallii Schult; Nuttall's Lobelia
Triodanis perfoliata (L.) Niewl.; Small Venus Looking-glass

CAPRIFOLIACEAE (Honeysuckle Family)
**Lonicera japonica* Thunb.; Japanese Honeysuckle
**Lonicera morrowii* A. Gray; Morrow's Honeysuckle

CARYOPHYLLACEAE (Pink Family)
Cerastium nutans Raf.; Nodding Mouse-ear Chickweed
**Dianthus armeria* L. subsp. *armeria*; Deptford Pink

**Petrorhagia prolifera* (L.) P.W. Ball & Heywood; Childing Pink
**Saponaria officinalis* L.; Soapwort, Bouncing Bet
**Silene latifolia* Poir.; White Campion, Evening Lychnis
Silene stellata (L.) Aiton f.; Starry Campion

CELASTRACEAE (Bittersweet Family)
**Celastrus orbiculatus* Thunb.; Oriental Bittersweet
Euonymus americanus L.; American Strawberry-bush

CISTACEAE (Rockrose Family)
Crocanthemum canadense (L.) Britton (=*Helianthemum canadense* (L.) Michx.); Canada Frostweed
Crocanthemum propinquum (E.P. Bicknell) E.P. Bicknell (=*Helianthemum propinquum* E.P. Bicknell); Low Frostweed
Lechea minor L.; Thyme-leaf Pinweed
Lechea mucronata Raf.; Hairy Pinweed
Lechea racemulosa Michx.; Oblong-fruit Pinweed, Common Pinweed

CLETHRACEAE (Clethra Family)
Clethra alnifolia L.; Sweet Pepperbush

CONVOLVULACEAE (Morning Glory Family)
Calystegia sepium (L.) R. Br.; Hedge Bindweed
Ipomoea hederacea Jacq.; Ivy-leaf Morning Glory

CORNACEAE (Dogwood Family)
Cornus amomum Mill.; Silky Dogwood
Cornus florida L.; Flowering Dogwood

CRASSULACEAE (Stonecrop Family)
Sedum ternatum Michx.; Wild Stonecrop

CUCURBITACEAE (Gourd Family)
Sicyos angulatus L.; Bur-cucumber

DROSERACEAE (Sundew Family)
Drosera intermedia Hayne; Spoonleaf Sundew

EBENACEAE (Ebony Family)
Diospyros virginiana L.; Common Persimmon

ELAEAGNACEAE (Russian Olive Family)
**Elaeagnus umbellata* Thunb.; Autumn Olive

ERICACEAE (Heath Family)
Chamaedaphne calyculata (L.) Moench; Leatherleaf
Chimaphila maculata (L.) Pursh; Striped Wintergreen

Epigea repens L.; Trailing Arbutus
Eubotrys racemosa (L.) Nutt. [=*Leucothoe racemosa* (L.) A. Gray]; Fetterbush
Gaultheria procumbens L.; Teaberry, Wintergreen
Gaylussacia baccata (Wangenh.) K. Koch; Black Huckleberry
Gaylussacia frondosa (L.) Torr. & A. Gray ex Torr.; Dangleberry
Kalmia angustifolia L.; Sheep Laurel
Kalmia latifolia L.; Mountain Laurel
Lyonia ligustrina (L.) A. DC. var. *ligustrina*; Maleberry
Lyonia mariana (L.) D. Don; Staggerbush
Monotropa uniflora L.; Indian Pipe
Rhododendron periclymenoides (Michx.) Shinners; Pinxterflower
Rhododendron viscosum (L.) Torr.; Swamp Azalea
Vaccinium corymbosum L.; Northern Highbush Blueberry
Vaccinium pallidum Aiton; Early Lowbush Blueberry

EUPHORBIACEAE (Spurge Family)
Euphorbia ipecacuanhae L.; Wild Ipecac
Euphorbia maculata L.; Spotted Spurge
Euphorbia nutans Lag.; Nodding Spurge, Eybane

FABACEAE (LEGUMINOSAE) (Legume Family)
Apios americana Medik.; Groundnut
Baptisia tinctoria (L.) R. Br.; Yellow Wild Indigo
Chamaecrista fasciculata (Michx.) Greene var. *fasciculata*; Partridge Pea
Chamaecrista nictitans (L.) Moench var. *nictitans;* Wild Sensitive Plant
Desmodium paniculatum (L.) A. DC.; Narrow-leaf Tick-trefoil
**Kummerowia stipulacea* (Maxim.) Makino; Korean-clover
**Kummerowia striata* (Thunb.) Schindl.; Japanese-clover
Lespedeza sp.
**Lespedeza bicolor* Turcz.; Shrubby Bush-clover
**Lespedeza cuneata* (Dum. Cours.) G. Don; Chinese Lespedeza
Lespedeza frutescens (L.) Hornem. [=*L. violacea* (L.) Pers.]; Violet Bush-clover
Lespedeza hirta (L.) Hornem. var. *hirta*; Hairy Bush-clover
Lespedeza procumbens Michx.; Trailing Bush-clover
Lespedeza repens (L.) W.P.C. Barton; Creeping Bush-clover
Lespedeza virginica (L.) Britton; Slender Bush-clover
**Melilotus officinalis* (L.) Lam.; Yellow Sweet-clover
Robinia pseudoacacia L.; Black Locust
**Securigera varia* (L.) Lassen (=*Coronilla varia* L.); Crown Vetch
Strophostyles umbellata (Muhl. ex Willd.) Britton; Pink Wild Bean
Stylosanthes biflora (L.) Brittons, Sterns & Poggenb.; Pencilflower **(S3)**
Tephrosia virginiana (L.) Pers.; Virginia Goat's-rue
**Trifolium arvense* L.; Rabbit-foot Clover
**Trifolium aureum* Pollich; Golden Clover, Large Hop Clover
**Trifolium pratense* L.; Red Clover
**Trifolium repens* L.; White Clover, Dutch Clover
**Vicia grandiflora* Scop.; Large Yellow Vetch

**Vicia sativa* L. subsp. *sativa*; Common Vetch
**Vicia tetrasperma* (L.) Schreb.; Slender Vetch

FAGACEAE (Beech Family)
Castanea dentata (Marshall) Borkh.; American Chestnut
Castanea pumila (L.) Mill.; Chinquapin **(S2)**
Fagus grandifolia Ehrh.; American Beech
Quercus alba L.; White Oak
Quercus coccinea Münchh.; Scarlet Oak
Quercus falcata Michx. ; Southern Red Oak, Spanish Oak
Quercus marilandica Münchh; Blackjack Oak
Quercus montana Willd.; Chestnut Oak
Quercus palustris Münchh; Pin Oak
Quercus phellos L.; Willow Oak
Quercus prinoides Willd.; Dwarf Chinquapin Oak
Quercus rubra L.; Northern Red Oak
Quercus stellata Wagenh.; Post Oak
Quercus velutina Lam.; Black Oak
Quercus × ludoviciana Sarg.; Willow Oak × Southern Red Oak
Quercus × saulii C.K. Schneid.; White Oak × Chestnut Oak (Saul's Oak)

GENTIANACEAE (Gentian Family)
Bartonia paniculata (Michx.) Muhl. ex Willd.; Twining Bartonia
Bartonia virginica (L.) Britton, Sterns, & Poggenb.; Yellow Screwstem

GERANIACEAE (Geranium Family)
Geranium carolinianum L.; Carolina Cranesbill
Geranium maculatum L.; Wild Geranium
**Geranium pusillum* L.; Small-flowered Cranesbill

HAMAMELIDACEAE (Witch Hazel Family)
Hamamelis virginiana L.; Witch Hazel

HYPERIACEAE (St. John's-wort Family)
Hypericum canadense L.; Canada St.John's-wort
Hypericum crux-andreae (L.) Crantz (=*Hypericum stans* W.P. Adams & N. Robson); St. Peter's-wort
Hypericum gentianoides (L.) Britton, Sterns, & Poggenb.; Orange-grass
Hypericum hypericoides (L.) Crantz subsp. *multicaule* (Michx. ex Willd.) N. Robson; St. Andrew's Cross
Hypericum mutilum L.; Dwarf St. John's-wort
**Hypericum perforatum* L.; Common St. John's-wort
Hypericum punctatum Lam.; Spotted St. John's-wort
Triadenum virginicum (L.) Raf.; (=*Hypericum virginicum* L.); Marsh St. John's-wort

JUGLANDACEAE (Walnut Family)
Carya glabra (Mill.) Sweet; Pignut Hickory

Carya pallida (Ashe) Engl. & Graebn.; Sand Hickory
Carya tomentosa (Lam. ex Poir.) Nutt.; Mockernut Hickory
Juglans nigra L.; Black Walnut

LAMIACEAE (LABIATAE) (Mint Family)
**Glechoma hederacea* L.; Gill-over-the-ground
Lycopus virginicus L.; Virginia Water Horehound
Monarda punctata L.; Horsemint
**Prunella vulgaris* L.; Self-heal
Trichostema dichotomum L.; Common Blue Curls

LAURACEAE (Laurel Family)
Lindera benzoin (L.) Blume; Spicebush
Sassafras albidum (Nutt.) Nees; Sassafras

LENTIBULARIACEAE (Bladderwort Family)
Utricularia purpurea Walter; Purple Bladderwort **(S3)**

LINACEAE (Flax Family)
Linum medium (Planch.) Britton; Stiff Yellow Flax

LYTHRACEAE (Loosestrife Family)
Decodon verticillatus (L.) Elliott; Swamp Loosestrife
**Lythrum salicaria* L.; Purple Loosestrife

MAGNOLIACEAE (Magnolia Family)
Liriodendron tulipifera L.; Tulip Tree
Magnolia virginiana L.; Swamp Magnolia

MELASTOMATACEAE (Melastome Family)
Rhexia mariana L. var. *mariana*; Maryland Meadow Beauty
Rhexia virginica L.; Virginia Meadow Beauty

MORACEAE (Mulberry Family)
**Morus alba* L.; White Mulberry

MYRICACEAE (Bayberry Family)
Comptonia peregrina (L.) J.M. Coulter; Sweet-fern
Morella pensylvanica (Mirb.) Kartesz; Northern Bayberry

NYMPHAEACEAE (Water-lily Family)
Nuphar lutea (L.) Sm. subsp. *variegata* (Durand) E.O. Beal; Variegated Yellow Pond-lily, Spadderdock
Nymphaea odorata Aiton subsp. *odorata*; White Water-lily

NYSSACEAE (Tupelo Family)
Nyssa sylvatica Marshall; Black Gum, Sour Gum

OLEACEAE (Olive Family)
Chionanthus viginicus L.; Fringe Tree **(S3)**
Fraxinus americana L.; White Ash
Fraxinus pennsylvanica Marshall; Green Ash

ONAGRACEAE (Evening-primrose Family)
Circaea canadensis (L.) Hill subsp. *canadensis* [=*C. lutetiana* L. subsp. *canadensis* (L.) Asch. & Magnus]; Enchanter's Nightshade
Ludwigia alternifolia L.; Seedbox
Oenothera biennis L.; Common Evening-primrose
Oenothera laciniata Hill; Cutleaf Evening-primrose

OROBANCHACEAE (Broomrape Family)
Agalinis purpurea (L.) Pennell; Purple False Foxglove
Aureolaria virginica (L.) Pennell; Downy Yellow Foxglove
Epifagus virginiana (L.) W.P.C. Barton); Beechdrops
Melampyrum lineare Desr. var. *americanum* (Michx.) Beuverd; Common Cow-wheat
Melampyrum lineare Desr. var. *pectinatum* (Pennell) Fernald; Pine Barren Cow-wheat

OXALIDACEAE (Wood-sorrel Family)
Oxalis stricta L.; Common Yellow Wood-sorrel

PAULOWNIACEAE (Paulownia Family)
**Paulownia tomentosa* (Thunb.) Siebold & Zucc. ex Steud.; Princess Tree

PHYTOLACCACEAE (Pokeweed Family)
Phytolacca americana L. var. *americana*; Common Pokeweed

PLANTAGINACEAE (Plantain Family)
**Linaria vulgaris* Mill.; Butter-and-eggs
Nuttallanthus canadensis (L.) D.A. Sutton [=*Linaria canadensis* (L.) Dumort.]; Blue Toadflax
**Plantago aristida* Michx.; Large-bracted Plantain
**Plantago lanceolata* L.; English Plantain
**Plantago major* L.; Common Plantain
Plantago virginica L.; Virginia Plantain
**Veronica officinalis* L.; Common Speedwell
**Veronica serpyllifolia* L. var. *serpyllifolia*; Thyme-leaf Speedwell

PLATANACEAE (Planetree Family)
Platanus occidentalis L.; American Sycamore

POLYGALACEAE (Milkwort Family)
Polygala nuttallii Torr. & A. Gray; Nuttall's Milkwort
Polygala polygama Walter; Racemed Milkwort **(S2)**

POLYGONACEAE (Smartweed Family)

Fallopia scandens (L.) Holub; Climbing False Buckwheat
Persicaria arifolia (L.) Haralds.; Halberd-leaf Tearthumb
Persicaria hydropiperoides (Michx.) Small; Mild Water-pepper
**Persicaria longiseta* (de Bruijn) Kitag.; Long-bristled Smartweed, Bristly-lady's Thumb
Persicaria sagittata (L.) H. Gross ex Loes.; Arrow-leaf Tearthumb
Persicaria virginiana (L.) Gaertn.; Virginia Knotweed, Jumpseed
Polygonella articulata (L.) Meisner; Coastal Jointweed
**Rumex acetosella* L.; Sheep Sorrel
**Rumex crispus* L.; Curly Dock

PRIMULACEAE (Primrose Family)

Triantalis borealis Raf.; Northern Starflower

RANUNCULACEAE (Buttercup Family)

**Clematis terniflora* A. DC.; Sweet Autumn Clematis, Japanese Clematis
Ranunculus abortivus L.; Kidney-leaf Buttercup

ROSACEAE (Rose Family)

Amelanchier canadensis (L.) Medik.; Canadian Shadbush
Amelanchier spicata (Lam.) K. Koch (=*A. stolonifera* Wiegand) Dwarf Shadbush, Running Shadbush **(S3)**
Aronia arbutifolia (L.) Pers.; Red Chokeberry
Aronia melanocarpa (Michx.) Elliott; Black Chokeberry
Aronia prunifolia (Marshall) Rehder; Purple Chokeberry
Crataegus uniflora Münchh. var. *uniflora*; One-flowered Hawthorn
Fragaria virginiana Mill.; Wild Strawberry
Geum canadense Jacq.; White Avens
Potentilla canadensis L.; Dwarf Cinquefoil
**Potentilla recta* L.; Sulphur Cinquefoil, Rough-fruited Cinquefoil
Potentilla simplex Michx.; Common Cinquefoil
Prunus serotina Ehrh.; Black Cherry
**Pyrus calleryana* Decne.; Callery Pear, Bradford Pear
Rosa carolina L. subsp. *carolina*; Carolina Rose, Pasture Rose
**Rosa multiflora* Thunb. in Murray; Multiflora Rose
Rosa palustris Marshall; Swamp Rose
Rubus allegheniensis Porter; Allegheny Blackberry
Rubus cuneifolius Pursh; Sand Blackberry
Rubus flagellaris Willd.; Common Dewberry
Rubus hispidus L.; Swamp Dewberry, Bristly Dewberry
Spiraea tomentosa L.; Steeplebush

RUBIACEAE (Madder Family)

Cephalanthus occidentalis L.; Buttonbush
Diodia teres Walter; Common Buttonweed
Galium aparine L.; Cleavers

Galium circaezans Michx.; Forest Bedstraw, Wild Licorice
Galium pilosum Aiton; Hairy Bedstraw
Mitchella repens L.; Partridge-berry

SALICACEAE (Willow Family)
Populus grandidentata Michx.; Bigtooth Aspen
Salix nigra Marshall; Black Willow

SANTALACEAE (Sandalwood Family)
Comandra umbellata (L.) Nutt.; Bastard Toadflax

SAPINDACEAE (Soapberry Family)
Acer rubrum L. (incuding var. *trilobum* Torr. & A. Gray ex K. Koch); Red Maple

SCROPHULARIACEAE (Snapdragon Family)
**Verbascum thapsus* L.; Common Mullein

SOLANACEAE (Nightshade Family)
**Datura stramonium* L.; Jimson Weed
Physalis heterophylla Nees; Clammy Ground Cherry
Solanum carolinense L.; Carolina Horse-nettle

URTICACEAE (Nettle Family)
Boehmeria cylindrica (L.) Sw.; False Nettle
Pilea pumila (L.) A. Gray; Clearweed

VERBERNACEAE (Verbena Family)
Verbena urticifolia L.; White Vervain

VIOLACEAE (Violet Family)
Viola affinis Leconte; Le Conte's Violet
Viola blanda Willd.; Sweet White Violet
Viola brittoniana Pollard; Coast Violet **(S3)**
Viola brittoniana var. *pectinata* (E.P. Bicknell) Alexander **(SH)**
Viola palmata L.; Wood Violet
Viola primulifolia L. [=*V.* × *primulifolia* L. (*V. lanceolata* × *V. macloskeyi*)]; Primrose-leaved Violet
Viola sagittata var. *ovata* (Nutt.) Torr. & A. Gray; Northern Downy Violet
Viola sagittata Aiton var. *sagittata*; Arrow-leaved Violet
Viola sororia Willd.; Common Blue Violet

VITACEAE (Grape Family)
Parthenocissus quinquefolia (L.) Planch.; Virginia Creeper
Vitis aestivalis Michx. var. *aestivalis*; Summer Grape

MONOCOTS

ALISMATACEAE (Water-plantain Family)

Alisma subcordatum Raf.; Southern (Small) Water-plantain
Sagittaria latifolia Willd.; Broad-leaved Arrowhead

AMARYLLIDACEAE (Amaryllis Family)

**Allium vineale* L.; Field Garlic

ARACEAE (Arum Family)

Arisaema triphyllum (L.) Schott subsp. *triphyllum*; Common Jack-in-the-pulpit
Orontium aquaticum L.; Golden Club
Symplocarpus foetidus (L.) Salisb. ex W.P.C. Barton; Skunk Cabbage

ASPARAGACEAE (Asparagus Family)

Maianthemum canadense Desf.; Canada Mayflower
Maianthemum racemosum (L.) Link subsp. *racemosum*; False Solomon-seal
Polygonatum biflorum (Walter) Elliott var. *biflorum*; Solomon's Seal

COLCHICACEAE (Meadow Saffron Family)

Uvularia sessilifolia L.; Sessile Bellwort

COMMELINACEAE (Spiderwort Family)

Commelina communis L.; Common Dayflower

CYPERACEAE (Sedge Family)

Carex abscondita Mack.; Small-fruited Summer Sedge
Carex albicans Willd. ex Spreng. var. *emmonsii* (Dewey ex Torr.) Rettig; White-tinged Sedge
Carex albolutescens Schwein.; Greenish-white Sedge
Carex annectens (E.P. Bicknell) E.P. Bicknell; Yellow-fruited Sedge
Carex atlantica L.H. Bailey subsp. *atlantica*; Prickly Bog Sedge
Carex atlantica L.H. Bailey subsp. *capillacea* (L.H. Bailey) Reznicek; Howe's Sedge
Carex blanda Dewey; Eastern Woodland Sedge
Carex bullata Schkuhr ex Willd.; Button Sedge
Carex canescense L. subsp. *disjuncta* (Fernald) Toivonen; Silvery Sedge
Carex collinisii Nutt.; Collin's Sedge
Carex crinita Lam. var. *crinita*; Long-fringed Sedge
Carex debilis Michx. var. *debilis*; White-edged Sedge
Carex folliculata L.; Northern Long Sedge
Carex glaucodea Tuck. ex Olney; Blue Sedge
Carex intumescens Rudge; Bladder Sedge
Carex longii Mack.; Long's Sedge
Carex lucorum Willd. ex Link var. *lucorum*; Woodland Sedge
Carex lupulina Muhl. ex Willd.; Hop Sedge
Carex lurida Wahlenb.; Sallow Sedge
Carex muehlenbergii Schkuhr ex Willd. var. *muehlenbergii*; Muhlenberg's Sedge

Carex nigromarginata Schwein.; Black-edged Sedge
Carex normalis Mack.; Greater Straw Sedge
Carex pensylvanica Lam.; Pennsylvania Sedge
Carex seorsa Howe; Weak Stellate Sedge
Carex striata Michx.; Walter's Sedge
Carex stricta Lam.; Tussock Sedge (includes the form *strictior*)
Carex swanii (Fernald) Mack.; Swan's Sedge
Carex tonsa (Fernald) E.P. Bicknell var. *tonsa*; Shaved Sedge
Carex tonsa (Fernald) E.P. Bicknell var. *rugosperma* (Mack.) Crins; Shaved Sedge
Carex tribuloides Wahlenb. var. *tribuloides*; Blunt Broom Sedge
Carex trisperma Dewey var. *trisperma*; Three-seeded Sedge
Carex trisperma Dewey var. *billingsii* O.W. Knight; Three-seeded Sedge
Carex venusta Dewey; Dark-green Sedge
Carex virescens Muhl. ex Willd.; Ribbed Sedge
Carex vulpinoidea Michx.; Fox Sedge
Cyperus esculentus L. var. *leptostachyus* Boeckeler; Yellow Nutsedge
Cyperus filicinus Vahl; Fern Flatsedge
Cyperus flavescens L.; Yellow Flatsedge
Cyperus grayi Torr.; Gray's Flatsedge
Dulichium arundinaceum (L.) Britton var. *arundinaceum*; Three-way Sedge
Eleocharis obtusa (Willd.) Schult.; Blunt Spikerush
Eleocharis olivacea Torr. var. *olivacea* [=*E. flavescens* (Poir.) Urb. var. *olivacea* (Torr.) Gleason]; Bright Green Spikerush
Eleocharis tenuis (Willd.) Schult. var. *tenuis*; Slender Spikerush
Eleocharis tuberculosa (Michx.) Roem. & Schult.; Long-tubercled Spikerush
**Kyllinga gracillima* Miq.; (=*Cyperus brevifolioides* Thieret & Delahouss.); Asiatic Greenhead Sedge, Pasture Spikesedge
Rhynchospora capitellata (Michx.) Vahl; Brownish Beaksedge
Scirpus georgianus R.M. Harper; Georgia Bulrush
Scleria triglomerata Michx.; Tall Nutrush

DIOSCOREACEAE (Yam Family)
Dioscorea villosa L.; Wild Yam

HELONIADACEAE (Swamp-pink Family)
Helonias bullata L.; Swamp-pink **(S3, LT)**

HYPOXIDACEAE (Stargrass Family)
Hypoxis hirsuta (L.) Coville; Eastern Yellow Stargrass

IRIDACEAE (Iris Family)
Iris versicolor L.; Northern Blue Flag
Sisyrinchium angustifolium Mill.; Narrow-leaved Blue-eyed-grass
Sisyrinchium atlanticum E. P. Bicknell; Atlantic Blue-eyed-grass

JUNCACEAE (Rush Family)
Juncus bufonius L.; Toad Rush

Juncus canadensis J. Gay ex Laharpe; Canadian Rush
Juncus debilis A. Gray; Weak Rush
Juncus dichotomus Elliott; Forked Rush
Juncus effusus L.; Soft Rush
Juncus marginatus Rostk.; Grass-leaved Rush
Juncus scirpoides Lam. var. *scirpoides*; Needle-pod Rush
Juncus tenuis Willd.; Path Rush
Luzula multiflora (Ehrh.) Lej. var. *multiflora*; Common Woodrush

LILIACEAE (Lily Family)
Erythronium americanum Ker Gawl subsp. *americanum*; Yellow Trout Lily
Lilium superbum L.; Turk's-cap Lily
Medeola virginiana L.; Indian Cucumber-root

MELANTHIACEAE (Bunchflower Family)
Amianthium muscitoxicum (Walter) A. Gray; Fly-poison **(S2)**
Veratrum virginicum (L.) W.T. Aiton (=*Melanthium virginicum* L.); Virginia Bunchflower **(S1, E)**

NARTHECIACEAE (Bog-asphodel Family)
Aletris farinosa L.; White Colicroot

ORCHIDACEAE (Orchid Family)
Cypripedium acaule Aiton; Pink Lady's-slipper, Moccasin Flower
Goodyera pubescens (Willd.) R. Br.; Downy Rattlesnake-plantain
Listera australis Lindl.; Southern Twayblade **(S3)**
Platanthera blephariglottis (Willd.) Lindl.; White Fringed Orchid
Platanthera clavellata (Michx.) Lindl.; Small Green Wood Orchid
Platanthera lacera (Michx.) G. Don; Green Fringed Orchid
Tipularia discolor (Pursh) Nutt.; Cranefly Orchid

POACEAE (GRAMINEAE) (Grass Family)
Agrostis perennans (Walter) Tuck.; Autumn Bentgrass
Agrostis scabra Willd.; Rough Bentgrass
**Aira caryophylla* L.; Silver Hairgrass
Andropogon virginicus L. var. *virginicus*; Virginia Broomsedge
Andropogon glomeratus (Walter) Britton, Sterns & Poggenb. var. *glomeratus*; Bushy Beardgrass
**Anthoxanthum odoratum* L.; Sweet Vernal Grass
Aristida dichotoma Michx.; Fork-tip Three-awn Grass
Aristida longespica Poir. var. *longespica*; Eastern Slim-spike
Aristida oligantha Michx.; Prairie Three-awn Grass
Aristida purpurascens Poir.; Purple Three-awn Grass
**Bromus inermis* Leyss.; Awnless Brome Grass
**Bromus japonicus* Thunb. in Murray; Japanese Brome Grass
**Bromus sterilis* L.; Poverty Brome
**Bromus tectorum* L.; Downy Brome, Downy Chess

Calamagrostis cinnoides (Muhlenberg) W.P.C. Barton; Nuttall's Reedgrass
Cenchrus longispinus (Hack.) Fernald; Northern Sandbur
Chasmanthium laxum (L.) Yates; Slender Spikegrass
Cinna arundinacea L.; Common Wood Reedgrass
**Cynodon dactylon* (L.) Pers. var. *dactylon*; Bermuda Grass
**Dactylis glomerata* L.; Orchard Grass
Danthonia compressa Austin ex Peck; Oatgrass
Danthonia sericea Nutt.; Silky Oatgrass
Danthonia spicata (L.) P. Beauv. ex Roem & Schult.; Poverty Oatgrass
Deschampsia flexuosa (L.) Trin.; Wavy Hairgrass
Dichanthelium aciculare (Desv. ex Poir.) Gould & C.A. Clark; Needle-leaf Panic Grass (**S1, E**)
Dichanthelium acuminatum (Swartz) Gould & C.A. Clark var. *acuminatum*; Wooly Panic Grass
Dichanthelium acuminatum (Swartz) Gould & C.A. Clark var. *fasciculatum* (Torr.) Freckmann; Slender-stemmed Panic Grass
Dichanthelium acuminatum (Swartz) Gould & C.A. Clark var. *lindheimeri* (Nash) Gould & Clark; Lindheimer's Panic Grass
Dichanthelium boscii (Poir.) Gould & C.A. Clark; Bosc's Panic Grass
Dichanthelium clandestinum (L.) Gould; Deer-tounge Grass
Dichanthelium columbianum (Scribn.) Freckmann; American Witch Grass
Dichanthelium commutatum (Schult.) Gould var. *ashei* (Pearson ex Ashe) Mohlenbr.; Ashe's Panic Grass
Dichanthelium commutatum (Schult.) Gould var. *commutatum*; Variable Panic Grass
Dichanthelium depauperatum (Muhl.) Gould; Starved Panic Grass
Dichanthelium dichotomum (L.) Gould var. *dichotomum*; Cypress Panic Grass
Dichanthelium ensifolium (Baldwin ex Elliott) Gould; Small-leaved Panic Grass
Dichanthelium latifolium (L.) Harvill; Broad-leaf Panic Grass
Dichanthelium lucidum (Ashe) LeBlond; Bog Panic Grass
Dichanthelium mattamuskeetense (Ashe) Mohlenbrock; Mattamuskeet Panic Grass
Dichanthelium meridionale (Ashe) Freckmann; Matting Panic Grass
Dichanthelium microcarpon (Muhl. ex. Elliot) Mohlenbr.; Small Fruited Panic Grass
Dichanthelium polyanthes (Schult.) Mohlenb.; Round-seed Panic Grass
Dichanthelium scoparium (Lam.) Gould; Velvet Panic Grass
Dichanthelium sphaerocarpon (Elliott) Gould; Round-fruited Panic Grass
Dichanthelium spretum (Schult.) Freckmann; Eaton's Panic Grass
Dichanthelium villosissimum (Nash) Freckmann var. *villossissimum*; White-haired Panic Grass
Digitaria cognata (Schult.) Pilger [=*Leptoloma cognatum* (Schultes) Chase]; Fall Witch Grass
**Digitaria sanguinalis* (L.) Scop.; Northern Crabgrass
**Eleusine indica* (L.) Gaertn.; Indian Goosegrass, Yard Grass
Eragrostis pectinacea (Michx.) Nees ex Steud. var. *pectinacea*; Tufted Lovegrass
Eragrostis spectabilis (Pursh) Steud.; Purple Lovegrass
Festuca rubra L.; Red Fescue
Glyceria canadensis (Michx.) Trin.; Rattlesnake Mannagrass
Glyceria obtusa (Muhl.) Trin.; Blunt or Coastal Mannagrass

Glyceria striata (Lam.) Hitchc. var. *striata*; Fowl Mannagrass
Hordeum pusillum Nutt.; Little Barley
Leersia oryzoides (L.) Sw.; Rice Cutgrass
Leersia virginica Willd.; White Grass
**Lolium perenne* L. var. *perenne*; English Rye Grass
**Microstegium vimineum* (Trin.) A. Camus; Nepalese Brown-top, Japanese Stiltgrass
**Miscanthus sinensis* Andersson; Chinese Silvergrass
Muhlenbergia schreberi J.F. Gmel.; Nimblewill
Panicum anceps Michx. var. *anceps* (Michx.) Soreng subsp. *anceps*; Beaked Panic Grass
Panicum rigidulum Bosc ex Nees subsp. *pubescens* (Vasey) Freckmann & DeLong; Long-leaved Panic Grass
Panicum rigidulum Bosc ex Nees subsp. *rigidulum*; Redtop Panic Grass
Panicum verrucosum Muhl.; Warty Panic Grass
Panicum virgatum L. var. *virgatum*; Switchgrass
Paspalum laeve Michx.; Field Paspalum
Paspalum setaceum Michx.; Slender Paspalum
Phalaris arundinacea L.; Reed Canary Grass
**Phleum pratense* L.; Timothy
**Phragmites australis* (Cav.) Trin. ex Steud. subsp. *australis*; Common Reed
Piptochaetium avenaceum (L.) Parodi; Eastern Needlegrass
**Poa annua* L.; Annual Bluegrass
**Poa pratensis* L. subsp. *pratensis*; Kentucky Bluegrass
Schizachyrium scoparium (Michx.) Nash var. *scoparium*; Little Bluestem
**Setaria faberi* R.A.W. Herrm.; Nodding Bristlegrass
Sorghastrum nutans (L.) Nash; Indian Grass
Sphenopholis nitida (Biehler) Scribn.; Shiny Wedgegrass
Sporobolis vaginiflorus (Torr. ex A. Gray) Wood; Poverty Dropseed
Tridens flavus (L.) Hitchc.; Tall Redtop
Vulpia octoflora (Walter) Rydb.; Six-weeks Fescue

POTAMOGETONACEAE (Pondweed Family)
Potamogeton foliosus Raf. var. *foliosus*; Leafy Pondweed

SMILACACEAE (Greenbrier Family)
Smilax glauca Walter; White-leaf Greenbrier
Smilax herbacea L.; Common Carrion-flower
Smilax rotundifolia L.; Bullbrier

TYPHACEAE (Cattail Family)
Sparganium americanum Nutt.; American Bur-reed
Typha latifolia L.; Common Cattail

XYRIDACEAE (Yellow-eyed Grass Family)
Xyris difformis Chapm.; Bog Yellow-eyed Grass

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Frontispiece 1. Johannes Baptista von Albertini; image courtesy Moravian Archives, Bethlehem, PA.

Frontispiece 2. Lewis David von Schweinitz; image courtesy Moravian Archives, Bethlehem, PA.

An Early Mycota: Johannes Baptista von Albertini and Lewis David von Schweinitz's *Conspectus fungorum in Lusatiae superioris agro Niskiensi crescentium*, with a Translation of the Latin Introduction into English

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ABSTRACT. This paper presents for the first time a complete translation from Latin to English of the introduction to Johannes Baptista von Albertini and Lewis David von Schweinitz's *Conspectus fungorum in Lusatiae superioris agro Nieskiensi crescentium. E methodo Persooniana*. The *Conspectus*, published in 1805, is a seminal work in mycology and documents 1130 fungi that grew in an area that is now eastern Germany and western Poland. It includes descriptions of the habitats in which these fungi are found and illustrations of scores of newly described taxa of fungi. A translation of the text into English (or into any other vernacular, for that matter) has been heretofore unavailable, thus limiting a full appreciation of the book. With this annotated translation of the introduction we hope to facilitate the use of this work to provide its insights into early 19th century European biodiversity, the ecological preferences of the fungi discussed, taxonomic concepts of fungal biology prevalent in the early 19th century, and an historical perspective regarding fungal biology.

INTRODUCTION

Floras and mycotas (i.e., descriptions of the fungi present in a given area) provide an indispensable, invaluable and irreplaceable window into the past, and present one of the few means at our disposal for investigating floristic and mycological changes through time. Relatively recent works can be reasonably straightforward to use (e.g. Harrelson and Cantino 2006; and references therein). However, this is not the case for older works; language barriers can make them difficult to use and changing taxonomic and geographic boundaries can make them difficult to interpret.

Johannes Baptista von Albertini (1769–1831) and Lewis David von Schweinitz's (1780–1834) *Conspectus fungorum in Lusatiae superioris agro Niskiensi crescentium. E methodo Persooniana* [*Conspectus*] includes detailed descriptions of the geographic area, Lusatia, covered by the work and contains illustrations of the fungi described. These taxonomic and geographic descriptions make the *Conspectus* potentially useful for modern researchers. However, the lack of a translation into any modern vernacular hinders its use for ecological analysis. Here we present an annotated translation of the original Latin text into English of the introduction of the *Conspectus*. Due to the relative ease of translation for the descriptions themselves, and because the introduction provides insight into Albertini and Schweinitz's methods and also additional habitat data that is not found elsewhere in the *Conspectus*, we have limited this current work to a translation of only the introduction to the *Conspectus*.

BACKGROUND

The *Conspectus* was published by Paul Gotthelf Kummer (1750–1835) (Börsenverein Der Deutschen Buchhändler 1897: 314, Anonymous 1846) in Leipzig and was available for purchase starting May 5, 1805 at the Easter Book Fair at Leipzig (Anonymous 1805: 8, Evenhuis 2014, Fries 1946). The 412-page volume includes 12 plates and contains descriptions and illustrations of fungi from Lusatia (Lausitz), a region along the Neisse River in what is now eastern Germany and western Poland; of the fungi included in the work, many were newly described and illustrated. Except for plate XI, each of the 12 color plates is noted either "v. S." or "L. v. S." followed by an abbreviated form of *fecit* [made by] or in the case of plate XII "*del. sc.*" [presumably *delineavit*, drawn by, and *sculpsit*, engraved by] indicating that Schweinitz was the illustrator (Hewitt 2002). Additional original illustrations (*Fungorum Nieskiensium Icones*) were made by Schweinitz but never published (Hewitt 2002).

Although Albertini's role as an advisor to the young Schweinitz is accepted, his contribution to the prose had been presumed at times to be limited or absent. This suspicion possibly originates in Walter R. Johnson's often-referenced (cfr. Arthur and Bisby 1918) contemporaneous memoir of Schweinitz, published shortly after his death, in 1835, wherein he attributes the authorship of the *Conspectus*'s introduction to Schweinitz (Johnson 1835). Later, Arthur and Bisby (1918) were certain the introduction was written by Schweinitz and according to Rogers (1977), Ricken, in his 1915 work on European agarics *Die Blätterpilze...*, implies that Schweinitz was the primary author of the entire work. Lastly, Benedict (1935a) perpetuates Johnson's claim and states that Schweinitz had the greater hand in the authorship of the descriptive text. Rogers (1977) clears up these misconceptions to a degree with evidence drawn from an unpublished manuscript prepared in 1946 by Adelaide L. Fries, Archivist for the Moravian Church in America, Southern Province of a translation from German to English of parts of Schweinitz's personal diary of the years 1801 and 1803 relating the creation of the *Conspectus*. In the entry for November 29, 1803, Schweinitz states that Albertini "was beginning his part of the work." On December 3rd he noted that he had read the first part of Albertini's work and on the 11th, he praised the "beautiful style" of Albertini's prose (Rogers 1977, Fries 1946).

Conversely, Fries's translation raises questions of Schweinitz's hand in the prose. Bearing in mind that the content of her manuscript has been selected and that she did not have access to successive diaries of 1804 and 1805 (if they were even produced), Schweinitz's recorded mycological activities mostly involve collecting, identifying and reading Persoon, then later drawing, painting, etching and illuminating the *Conspectus* plates. Nowhere is it given that he specifically mentions writing text. Fries's impressions of the young man Schweinitz, written in her introductory remarks to the translations, are that he did most of the collecting and was a fledgling taxonomist, working in concert with but relying to some degree upon his mentor Albertini. Rogers (1977) and Arthur and Bisby (1918) state that Schweinitz, in addition to creating the plates, wrote "some part" to "much" of the text, but the origin of their claims are not given. It is clear that both Albertini and Schweinitz applied equal and consistent effort in the development of the *Conspectus*, but a more precise account of Schweinitz's contribution to the prose is currently out of reach.

It has been said that "For its authors, the *Conspectus Fungorum* established a reputation and gave them prominence among European mycologists" (Benedict 1935a), and it was remarked at the beginning of the first review of the *Conspectus* that though the authors were theretofore not known and the publication is based on observations, that it was very well received due to its thoroughness. The reviewer further notes that those who study *Schwämme* [fungi] will have to compare the new discoveries outlined in the *Conspectus* with other valuable and specialized miscellaneous works, notably Persoon's *Synopsis*. The lack of an *index speciarum* in the *Conspectus* is lamented, as well as the cost of the volume, which they considered prohibitive (Anonymous 1806). After the *Conspectus*, Schweinitz continued to publish works on American fungi: *Synopsis Fungorum Carolinae Superioris* (1822), *Description of a number of new American species of Sphaeriae* (1825) and *Synopsis Fungorum in America Boreali media degentium* (1832), the last of these published two years before his death in 1834 (Johnson 1835). His work had a profound influence upon the maturation of the botanist who would erect the framework of our modern mycological classification scheme, Elias Fries (Rogers 1977). Albertini authored at least three publications and contributed to two local floras and a flora of Germany (Barber 1898, Seidel 1923, Rogers 1977), but he did not publish any other mycological work (Rogers 1977). Rogers (1977: 236) also references a manuscript which also formerly existed: "*Flora Niskiensis*", and Schade (1961) referred to a manuscript: "*Fungi niskienses Mskr.*" (Ausführliche Namensverzeichnisse ohne Fundorte!)" ["Detailed list of names without location"].

DISCUSSION

Because of the many newly described taxa, the *Conspectus* is an important taxonomic work. But beyond the strictly taxonomic applications, it is also a valuable ecological document. In addition to notes on the distribution, plant associations and phenology of the fungi, the *Conspectus* more broadly serves as a record of the fungi growing in Lusatia prior to the industrial revolution, with the unpublished *Fungorum Nieskiensium Icones* giving further documentation; for example, the IUCN Red List Vulnerable species *Hydnellum compactum* (in the Conspectus as *Hydnum compactum*) is noted in the *Conspectus* as being present and "infrequens" (Latin for "infrequent"). Due to the well-defined geographic area these works cover (Figures 1 and 2), a comparative floristic analysis would be feasible: one could contrast the Lusatian fungal community of Albertini and Schweinitz's time to that region's modern mycota. Some work relating to these lines has been published e.g. Schade (1961), Barber (1898), and Gebauer and Otto (2004). This highlights the importance of preserving knowledge of early floras and mycotas, as they are one of the few means we have to track floristic and mycological changes through time, and can serve as useful tools to study environmental changes, both anthropogenic and otherwise. For example, Miller-Rushing and Primack (2008) used the notebooks of Henry David Thoreau, and floristic information from other botanists, to document changes in flowering time in Concord, Massachusetts, USA over the span of a century and half. Pritzel (1872: 464–506) and Lindau and Sydow (1915) contain extensive lists of historical works that could be used for comparative studies with extant biological communities.

Furthermore, it is of interest to note the early concepts of fungal biology, handed down from Lichtenstein (1803a, 1803b), that Albertini and Schweinitz mention. Two of

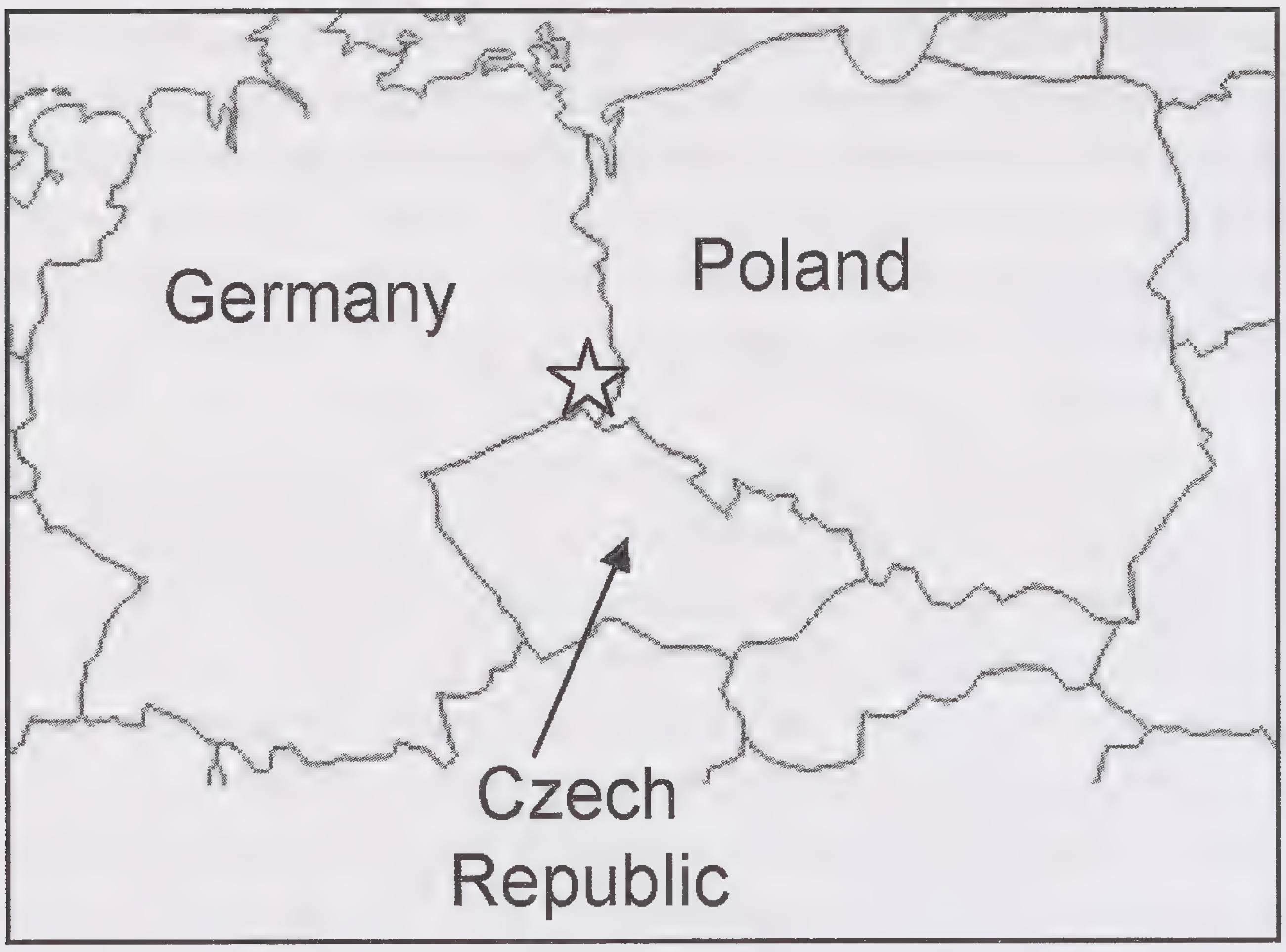

Figure 1. Map showing the region (starred) documented by Albertini and Schweinitz's *Conspectus Fungorum.*

Lichtenstein's works are cited, and their titles translate into English as "On the existence of zoophytes in open air" (Lichtenstein 1803a) and "On the plant-animals that live outside of the water, and their strange transformations into some molds and similar organisms that have heretofore been commonly included in the plant kingdom" (Lichtenstein 1803b). These works are filled with descriptions of what were believed to be life histories of various fungi as they metamorphosed from one form to another. These metamorphoses may well have represented fungal succession: as one individual died and rotted away, it was superseded by another; this may have given the appearance of a single individual changing from one form to another. The parts that are cited in the *Conspectus* (q. v.) include such observations as: "The smell, the taste and the chemical components of the molds suggest that they belong more to the animal than to the plant kingdom. And so, the opinion of Mr. Münchhausen that molds arise from zoophytes has to be reconsidered" (Lichtenstein 1803b: 502–503). Here, we assume that by zoophytes he means flagellated cells, although he could also have meant protists. As Albertini and Schweinitz also cite in the *Conspectus* (q. v.), Lichtenstein (1803b: 506) states that "*Tubulif*[...]. *cremor*[...] [=*Tubulifera cremor*] seems to come from *Phallus impudicus* and when it is totally dead and sucked out then it will become *Lichen paschalis* or *Stereocaulon paschale*." He gives the common name of *Phallus impudicus* as "Steinaderschwamme" which translates as "stone vein fungus." The *Conspectus* also includes another of Lichtenstein's concepts, that "Hoffman drew without even knowing from a distance that he was actually drawing a magnified air zoophyte, and this air zoophyte has only 6 arms but otherwise it looks like a 'vorticella anastasica' which occurs in standing water, and these he named *Trichodermia* [sic] *rosea*." (Lichtenstein 1803a: 51). *Vorticella* is a ciliate, and, due to the quality of the microscopes of the time, would have been difficult to distinguish from a fungus.

A facsimile of the *Conspectus* was published in 1992 (Albertini and Schweinitz 1992), however, a full translation of the text into English (or into any other vernacular, for that matter) has been heretofore unavailable though portions of the introduction have been

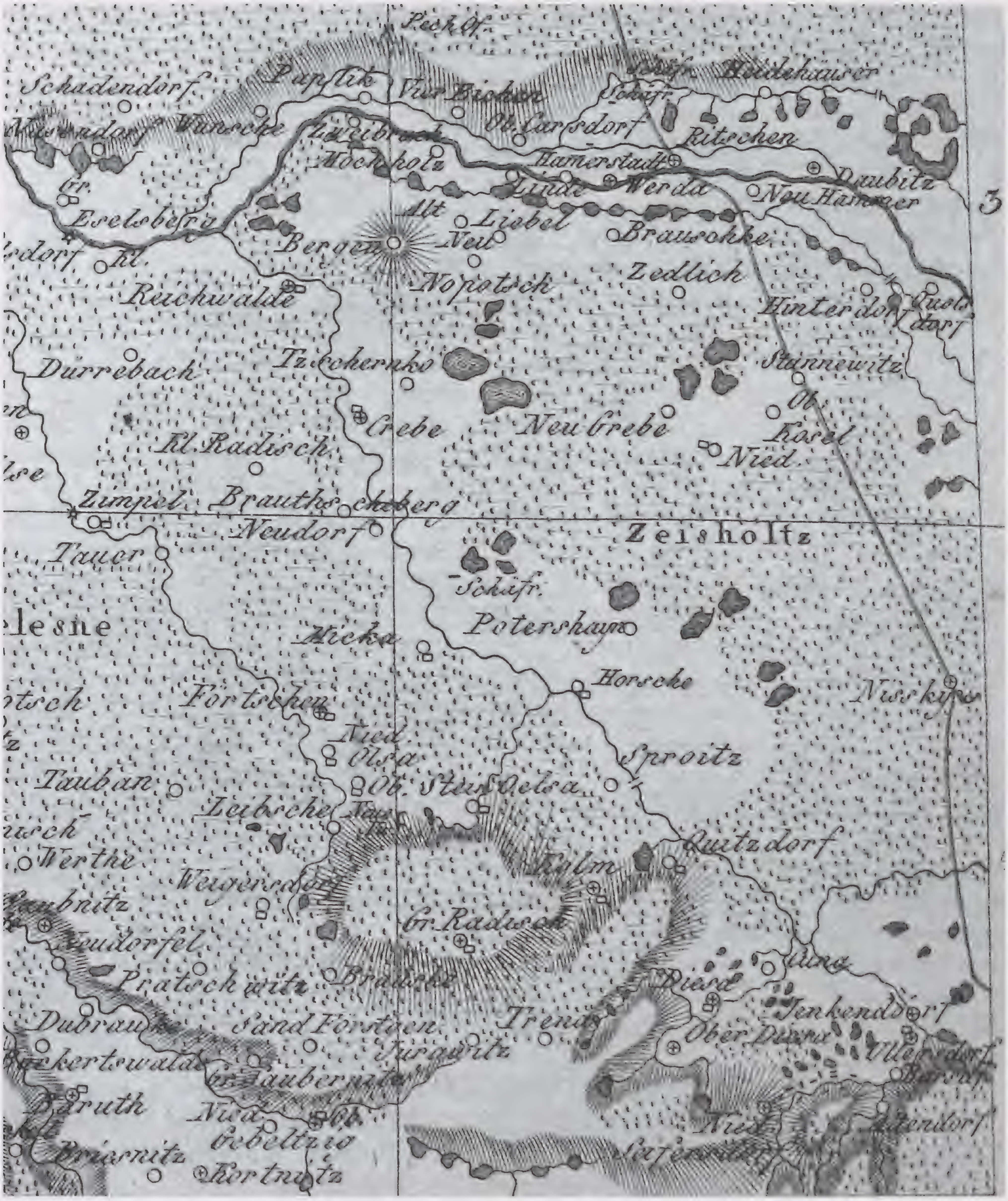

Figure 2. Nearly contemporaneous map (Geographisches Institut, 1807) that includes the region treated in the *Conspectus*. Nissky (now spelled "Niesky") is at the center right. Kosel (in Polish, Kozle) is to the north of Nissky. The Sudetic Mountains are across the bottom. (Reproduced courtesy of the Harvard Map Collection).

translated into English and/or paraphrased at length in Johnson (1835) and more concisely in Rogers (1977). Here we present a complete English translation of the title page and introduction to the *Conspectus* with our comments in NOTES.

Translation

[1]An overview of fungi growing in the area of Niesky in Upper Lusatia, according to the methodology of Persoon.

With twelve bronze painted tables, setting forth ninety-three new species.

Authored by J. B. de Albertini and L. D. de Schweinitz

Leipzig
At the expense of Kummer
In the year 1805

[2]To the kind reader, greetings:

There are a few matters which we think must be mentioned at the start concerning the intention and methodology of our treatise, lest a person seek on these pages more or different material than he will find.

For a long time we have been fascinated by the allure of botany, so much that we have devoted no small amount of our free time to it. When finally we came upon the study of mycology, we readily observed that before us lay open an unusually extensive field of study, which until now has been neglected by other investigators. By working carefully and to the best of our abilities for a number of years, we feel especially encouraged and inspired to undertake eagerly our inquiries, aided now by the *Synopsis Fungorum*, by Persoon, a man pre-eminently distinguished in the entire field of mycology, whose published work, instructive as a reliable course of future investigations, has been received by a very appreciative audience. We have also been inspired even more by a diligent study of the additional works of Persoon and of other distinguished writers on the latest developments in mycology: men like Schrader, Tode, Hoffman, Hedwig, Withering, and Gärtner.[3] From them we have learned that our region abounds with many *new fungi*, even though those have not yet been described by distinguished and well-known investigators.

We discovered that these new fungi exceeded a hundred in number, both new and previously-known varieties, and the abundance of species appears to grow daily. In order to illustrate more fully those species that have been recorded, it is our plan to publish our findings publicly with the thought that we would undertake a labor which has scientific value and will be welcomed by those interested in the topic. We have undertaken the task with intense concentration, bolstered by the hope that if more mycologists follow our example, German botanical studies will be enriched by a fuller knowledge of the indigenous fungi. No one who is well-informed on these matters will doubt that there are many matters which until now have lay hidden, buried in deep darkness.

In order to foster smoother, more successful research for those who follow us, those living in Lusatia, and in other parts of Germany as well, we offer a detailed listing of individual fungi with exact details of their origin and location, whether occurring naturally or cultivated especially Hymenotheciis[4], which are the fungi that tend to be preferred by investigators. We are indeed pleased to have obtained a suitable opportunity for offering some observations concerning the entire range of mycological features in our region.

No one is unaware of the obvious fact that our land, which faces north and east, is gravelly, sandy, and covered by vast pine forests comprised in particular by *Pinus sylvestris*, but also *Erica*, *Vaccinium*, and *Ledum palustre*, and interspersed here and there by enormous deep marshes. This area nurtures an abundant mixture of fungi, of all kinds, which have scarcely been investigated. The vegetation, which is in ancient forests that are mossy, dark, and deeply shaded, is watered moderately and intermittently, and thus the old trunks are rotted. (Our treatise particularly treats the area enclosed in a wide space that extends between the districts Moholz and Cosel[5], which is called Moholzer Heide[6].)

On the other hand, for those who prefer pleasing groves of leafy trees or grassy meadows, to the west and south lie more fertile lands: upland pastures, enclosed valleys, and the mountains facing the Sudetic Mountains[7], which present a pleasant variety as they ascend gradually. These features too add to our store of natural treasures, offering points of interest that should not be overlooked. Among trees that support the growth of fungi, besides *Abies*, *Populus tremula*, *Quercus*, *Betula*, etc., which have for some time been known for the abundance of their fungi, one must note *Pinus sylvestris* (to which we usually assign the common name "Pine of prominence"[8]), which, although the most numerous of all trees and especially productive of new species, has been deemed less worthy of study by our predecessors. *Ledum palustre* exists not much less frequently; this shrub is quite rare elsewhere in Germany but is very common in our area. Nor should one overlook *Pinus picea*[9], which is favorable to certain choice, smaller fungi and has provided new species.

Taking everything into consideration, it seems no less than marvelous that within a brief span of years and despite various impediments to the task such a large quantity of fungi has been collected by only a few botanical investigators, among whom we gratefully mention the names of Steinhauer[10] and our own Voullar[11].

We are all the more sure that the cache of riches in which our land rejoices must not be overlooked even though species still lie hidden there; in fact, we are at this time pursuing unidentified species.

But now let us set forth the rationale for the methodology that we have preferred in writing our treatise. Lest any unnecessary repetitions occur, we have proceeded by following the very footsteps of the *Synopsis*.[12] As faithful colleagues with the same agenda, we have completely refrained from altering designations of class, order, genus, family, and species. For it is our firm judgment that the student of mycology should in no manner abandon the methodology for observing fungi that has been employed in the peerless *Synopsis*.

The renowned author himself would not deny that there are some entries in the Persoonian System that are in need of an emending hand, e.g. there are genera which correspond in fructification (especially in Helvelloidei) but are not readily distinguishable except in form, and these are based on somewhat insufficient documentation.[13] Other genera, e.g. *Cyathus*, *Stilbum*, and *Aegerita*, are inappropriately categorized.

Nevertheless, we frankly acknowledge that we possess neither the keenness and erudition nor the leisure and equipment that would be sufficient for presenting new genera and taxonomies. We are of the general opinion that such efforts are the bailiwick of men who spend their lives pursuing these studies professionally, rather than the work of those who do research merely for the love of botany and who seek diversion from the distractions and fatigue of other mental labors.

For the fact has not escaped us that some people criticize revisions of projects more readily than they themselves create new and better ones. The investigator who has resolved to build upon a really solid foundation, not an insecure one, will be involving himself in no idle amusements of the mind. Rather, he will strive to accomplish his purpose by regular manipulations of the microscope on a daily basis, by the most scrupulous examination of the entire six-hundred year history of the study of fungi (especially of their fruitbodies), by the diligent perusal of authors and a comparison of synonyms, and, above all else, a study of live *Nature herself*: in day-to-day *observations*, repeated over a succession of years, of the flourishing remoteness of forests, upland pastures, and marshes.

Careful investigators will surely take heed of those strange hypotheses, which until very recently were indeed a source of wonder, and which we, who have for so long been denying the truth before our very eyes, now see revealed in clear light. For example: 1) There exist pure examples of zoophytes which have arisen from change with age or from disease in *Lycoperdon, Peziza, Boletus, Hydnum* (*Voigts Magaz. f. d. Naturkunde, vol. VI. fasc.* 6. *pag.* 503 *sqq.*); 2) *Tubulina fragiformis* is a progeny of *Phallus impudicus* which when decayed becomes *Lichen paschalis* (*l.c.p.*[14] 506); 3) a little mass of dust mixed with threads of *Trichoderma roseum* grows moderately to the size of a lentil — illustrated separately in *Hoffmannus flor. German. Cryptog. Tab.* X, 1. — and is similar in appearance to a zoophyte equipped with six branches (*l.c. fasc.* 1, *pag.* 51). And there are many similar phenomena.

However, not only in revising the System, but also in expanding the genera, families, and species, we must proceed with great caution, guided by the experience of the master. We have admitted only two new genera (further illustrated in their appropriate places), *Pisolithus* and *Ceratium*, and an equal number of families[15]: *Epixyla* in *Xyloma*, of course, and also *Acicola* in *Aecidium*. Nor do we think it appropriate to increase the number of species by acting too quickly and freely. We have chosen to subjoin very many fungi (especially in the very intricate genus of *Agaricus*) which are perhaps worthy as species unto themselves, to similar ones, rather than introduce them presumptuously as separate fungi.

In the event that among our entries are specimens which have already been described by others, we hope that we will be judged fairly and will be quickly pardoned for our errors. For we are not cosmopolitans, and we are operating in the countryside at a distance from the scholarly treasure-houses of the metropolises: better libraries and more exact illustrations of specimens, and the works of Bulliard, Sowerby, Bolton, Schäffer, Micheli, Batsch, etc.[16] Accordingly, we think it fair that we not be rebuked too severely for each and every erroneous synonym which appears in our treatise.

Moreover, in addition to the new species which we have added to the collection, there were also several others which are still in dispute and which have not yet been sufficiently examined. We have undertaken to mention these items in a succinct fashion at the end after each genus, in hopes of opening further the path of inquiry for future investigators.

We think that equal attention should be paid especially to rank of variety which is known to exist abundantly with all the others among the unrestrained caprice of Nature. We have designated these new ones of ours[17] with double Greek letters, to distinguish them from those previously noted in the works of our predecessors.

Additionally, we have decided to include here and there some diverse observations on Nature herself which may lead to a fuller understanding of fungi. The names of our discoveries are added to the few which are not included in the *Synopsis*. A great number which were retained by the esteemed Persoon have been set in their own places without any further additions. Among those found so far are some English, French, and Italian exotics: more *meklenburgenses*[18] than are worth mentioning: *Epichysium argenteum*, *Chordostylum capillare*, various *Sphaeriae*, etc., and also in particular rather prominent *carinthiaci*[19], German (apparently southern and eastern) associates, e.g., *Clavaria crispa*, *Hydnum suaveolens*, *Peziza nigrella*, and *Trichia serpula*.

In all these instances we have compiled the specific epithets, and we have scrupulously refrained from making any changes, even though they may seem unsuitable here and there. In the few instances that resulted in errors, we acted with great reluctance. For we realize completely how much damage has been caused, and to this day continues to be caused, to universal natural history by the accretion and complication of synonyms.

Finally, we have added such small illustrations as seems necessary to promote the utility of our treatise. Our specific purpose was to gather together in the confined space of twelve (more would enlarge the treatise unduly) tables as many of the new species as possible, with particular emphasis on those which are difficult to recognize merely from a description. Accordingly, we decided to omit the Agarics and other large fungi which with few exceptions require more space, and to depict in individual illustrations those attributes which make for a precise identification, especially in the absence of a careful and complete examination. And to the degree that we were able, we selected specimens which are recent and fully mature for use as illustration. Nevertheless, in particular we have especially used as aids either 1) the dried mycological Herbarium, which comprises by far the greatest number of our native preserved fungi, or 2) volumes of illustrations with which we have consistently taken pains to research, especially for the fleshy fungi.

Our hope is that critics who find the inevitable defects in our illustrations will bear in mind that this is, without apology, a first attempt at the art of engraving, inspired by the sheer love of science.

We would add further this one point: we deem our time and effort not to have been in vain if in the end we have somehow directed the eyes of botanists toward mycology, a field of study which has been ignored as unworthy until now, and which should be held in higher esteem and prominence. Until the field is studied more skillfully and completely, no one can hope for better, more reliable insights in Nature's truths for a majority of problems inherent in the study of plant anatomy and the natural history of fungi.

We present this at Niesky in May 1804.

I. B. de Albertini
L. D. de Schweinitz

TRANSLATION NOTE

The translation is primarily by Peter Amram who provided the following notes (edited):

The authors wrote in an orotund academic style. In translating, I have consistently eliminated redundant words (especially transitional adverbs and subordinating conjunctions), changed passive constructions to active, elevated participles to main verbs, and generally pruned litotes, prolixity, and similar verbal underbrush. The intent was to create a clear English version for the reader who is more interested in botany than rhetorical flourish.

Nevertheless, I have been careful to maintain the adulatory attitude of the authors for the master Persoon. The citations to learned journals of the time, species names and words italicized for emphasis are as they were in the original text. Human surnames (e.g. Tode, Bolton, etc.), have not, in the interest of readability, been italicized herein.

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ENDNOTES

[1] Title page.

[2] Introduction begins.

[3] According to Benedict (1935b), the following books which Albertini and Schweinitz had at their disposal, here listed by the authors' names, were likely also in Schweinitz's library in America at the time of his death: Persoon's *Synopsis Methodica Fungorum* from 1801 and *Tentamen Dispositionis Methodicae Fungorum* from 1797, Schrader's *Spicilegium Florae Germanicae* from 1794, Tode's *Fungi Mecklenburgenses Selecti* from 1790 and 1791, Hoffman's *Vegetabilia Cryptogama* from 1787-1790 and *Deutschlands Flora* from 1795, Hedwig's *Species Muscorum Frondosorum* from 1801 and Gärtner's *Oekonomisch-technische Flora der Wetterau* (with Meyer and Scherbius) from 1802. No titles from Withering nor Lichtenstein are listed.

[4] = Fleshy fungi with an exposed hymenium and pulverulent spores.

[5] = Kozle, in Polish – this is the "Kozel" just north of Nissky in Figure 2.

[6] = heath; Figure 2.

[7] = Sudetes, mountain range running along the north border of the Czech Republic.

[8] Common name is given in Greek: κάτ΄ εξοχήν.

[9] = *Abies alba.*

[10] Likely referring to Henry Steinhauer (1782-1818), a fellow botanical amateur and 'cherished associate' at the Academy at Niesky where Schweinitz and Albertini taught (Johnson 1835: 11). Steinhauer was born in Haverfordwest, UK and studied at the Moravian seminary at Niesky for a period prior to October, 1801 when he arrived at Fulneck, Yorkshire, UK as teacher at the Boy's Moravian School (Torrens 2005). Note added in proof: according to Steinhauer (in a letter from 1810), "The origins of the examinations which produced this volume, was a determination of Mr. Schweinitz and myself, in the autumn of 1798, to employ the leisure of college occupations, in collecting the fungi of the neighborhood; as the phaenogamic plants had been so well investigated by our predecessors, as to afford us - at least as we thought so then - little hope of very extraordinary discoveries", and then "In the course of two years, during which we pursued our researches in the company of some other friends, with increasing ardor; we made a very considerable collection of drawings copies of which we communicated to one another; but just at the time that Persoon's Synopsis had enabled us to begin an arrangement of our rudis indigestaque moles [="rough and unordered mass"], I returned to England, my native country. Schweinitz however proceeded, encouraged by Albertini a botanist of great acccuracy and perseverance; and in the course of a few years, produced the Fungi Nieskensis, a proof at least of the their industry and the immense riches of the district." (Steinhauer 1810). In 1816 Steinhauer settled in America at Bethlehem, PA near his old friend Schweinitz as Principal of the Bethlehem Moravian Girls' Boarding School. His brother

Joseph Daniel (known as Daniel) (1785-1852) arrived in America in February, 1818 and was also a noted botanist and friend of Schweinitz (Torrens 2005).

[11] Barnhart (1935) mentions that there are entries in Schweinitz's personal list of correspondents that had 'successfully eluded [Barnhart's] efforts to discover facts concerning them...'; one entry is listed as 'Voullaire Marc Henersdf', who is Marc Voullaire, a teacher and director of the Katharinenhof school at Grosshennersdorf at Herrnhut, Germany, and who had botanical interests (Barber 1898, Gebauer and Otto 2004). Furthermore, "Marc Voullaire Helv. & Germ." is listed as one of the *Contributores* to Schweinitz's herbarium in his manuscript *Herbarii Ludovici David de Schweinitz. Index Systematicus. Sistens Plantas Zonae temporatae omnes i.e. Europae, Asiae borealis et Americae. Gramina autem ac Filices ac Cryptogamiam. 1822* housed at the Academy of Natural Sciences of Drexler University, Collection 137. "Helv." refers to "Helvetica", i.e. Switzerland.

[12] I.e., Persoon's *Synopsis Fungorum* (Persoon 1801).

[13] In the *Conspectus* (Albertini and Schweinitz 1992), the Helvelloidei include *Spathularia*, *Leotia*, *Helvella*, and *Morchella*, although not *Geoglossum*, which is grouped with *Clavaria* in the Clavaeformes; we take fructification (= *fructificatione*) to mean the organization of the hymenium relative to the stipe (i.e. confluent versus distinct) and form (= *formae*) to mean the overall shape of the ascomata.

[14] Also in Voigts Magaz. f. d. Naturkunde, vol. VI, fasc. 6.

[15] The authors use *familias*; their use of "family" as an infrageneric rank is incorrect. They are likely using the term in a loose sense and it may be considered equivalent to the subgeneric rank of "section" as Persoon employed in the *Synopsis.*

[16] These refer to major contemporary mycological works; for further bibliographical information, refer to Pfister et al (1990).

[17] I.e., the new varieties they have named.

[18] I.e., probably referring to species described by Heinrich Julius Tode in *Fungi meklenburgenses selecti* of 1790-1791.

[19] I.e. from Carinthia.

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Herteliana schuyleriana (Squamarinaceae), a new crustose lichen widespread in the Appalachian Mountains of eastern North America

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ABSTRACT. *Herteliana schuyleriana* is described as new to science based on collections from throughout the Appalachian Mountains of eastern North America. Taxonomic placement is inferred from molecular phylogenic analysis of mtSSU sequence data that recovered the taxon as sister to the type species of *Herteliana*, *H. gagei*, and strongly supported these taxa as embedded within the Squamarinaceae. The new species is characterized by its occurrence on non-calcareous shaded rocks in inland forested habitats (vs. exposed maritime oceanic habitats), its greenish-blue crustose thallus, presence of abundant blastidia on the thallus surface, frequent sterility, and by the production of roccellic/angardianic acid together with occasional trace amounts of psoromic acid as accessories to atranorin.

INTRODUCTION

Lichens are fungi that form obligate symbioses with algae and comprise a conspicuous component of many terrestrial ecosystems worldwide (Brodo et al. 2001). North American lichens are well studied compared to some other regions of the world, and as such the majority of taxa encountered during biodiversity inventories can be readily assigned to a genus and species after chemical and morphological study (see e.g., Spribille et al. 2010, Knudsen and Kocourková 2012, Hutten et al. 2013, Knudsen et al. 2013, Lendemer et al. 2013, Lücking et al. 2013). Nonetheless, even in areas of North America that have been studied for centuries, a surprising number of species new to science continue to be discovered (Spribille et al. 2010, Lendemer et al. 2013, Lücking et al. 2013). Some such species are rare and evidently very narrowly distributed (Westberg et al. 2011, Morse 2013, Morse and Ladd 2013, Lendemer and Tripp 2015, Tripp and Lendemer 2015), while others are widespread and even common (e.g., Pérez-Ortega and Spribille 2009, Esslinger et al. 2012, Hodkinson and Lendemer 2012, Allen and Lendemer 2015).

The development of my interest, and subsequent career, in studying lichens was first fostered by Ernie Schuyler, the then Curator of Botany at The Academy of Natural Sciences of Philadelphia. Ernie encouraged me to explore the rich historical collections at that institution, and moreover to do so while having a good time. During some of my earliest field trips with Ernie and other botanists from the Philadelphia area I collected an inconspicuous sterile crustose lichen growing on shaded non-calcareous rocks. Over time I found the species at numerous sites in southeastern Pennsylvania, but was never able to identify it. Upon moving to New York to pursue doctoral studies I undertook a large scale inventory of lichens throughout Pennsylvania and again encountered the species repeatedly, accumulating many collections from that state. When Erin Tripp and I began to explore the lichens of the southern Appalachian Mountains, we again found the same species. Since this species was always sterile, and neither the morphology nor chemistry were so distinctive as to place it unambiguously in a known family or genus, it remained unidentified and collections continued to accrue.

During my dissertation work on the sterile dust lichen genus *Lepraria* Ach., Brendan Hodkinson and I developed a protocol to use molecular phylogenetic analyses to determine the taxonomic affinities of sterile asexually reproducing lichens that could not readily be assigned to a genus or family with chemistry and morphology (Hodkinson and Lendemer 2012). As such I generated sequences of the unidentified species that Ernie and I had first seen nearly a decade earlier. Study of these data confirmed the distinctiveness of this unusual crustose lichen as a previously unrecognized member of the lichen genus *Herteliana* P. James. The results of this study are presented here wherein the species is described as *H. schuyleriana*.

MATERIALS AND METHODS

Morphological and chemical methods. This study is based on material deposited in the herbarium of The New York Botanical Garden (NY) and borrowed on loan from DUKE. The morphology of each specimen was studied dry using an Olympus SZ-STB dissecting scope, while anatomical structures were studied via sections of the thallus mounted hand cut with a razor blade and mounted in water. Measurements of anatomic structures were made using an Olympus BX53 compound microscope equipped with a DP72 digital camera and CellSens imaging software. Chemistry was initially studied using standard spot test reagents (Brodo et al. 2001) and then subsequently with Thin Layer Chromatography (TLC) using solvents A and C following Culberson and Kristinssen (1970) as modified by Lendemer (2011a).

Molecular data generation. DNA was extracted from subsamples of the thallus that had already been subjected to an acetone extraction as part of previously conducted TLC analyses. Extraction protocols, PCR amplification of the nrITS and mtSSU regions, and sequence assembly followed the methods outlined in detail by Hodkinson and Lendemer (2012).

Alignment assembly, taxon sampling and molecular phylogenetic analyses. Based on the identity scores of MegaBLAST searches of the newly generated mtSSU sequences, the taxon that was the subject of this study was considered to have an affinity to *Lepraria* in the Stereocaulaceae (identity ~75%) and other families in the Cladoniineae as circumscribed by Miadlikowska et al. (2014). In order to evaluate the position of the newly generated sequences to members Cladoniineae an mtSSU dataset was assembled using the taxon sampling of Miadlikowska et al. (2014) except that the Stereocaulaceae sampling followed Lendemer and Hodkinson (2013) with a reduced sampling within *Lepraria* s. str. due to the large number of identical sequences available in GenBank.

The dataset was aligned using the MAFFT online interface (http://mafft.cbrc.jp/alignment/server/) and manual adjustments were made in Mesquite 3.02 (Maddison and Maddison 2015). Ambiguously aligned regions were defined as part an exclusion set and uncertainties/polymorphisms were transformed to missing. An initial set of maximum parsimony (MP) analyses were performed using PAUP*4.0a145 (Swofford 1998) after transforming the terminal gaps of the alignment to missing. For the MP analyses an initial search was made with 1000 random-addition-sequence (RAS) replicates and tree bisection connection (TBR) in branch swapping. MULTREES was in effect and zero-length branches were collapsed. All equally parsimonious trees were saved with branch lengths, and a strict consensus tree was computed for reference. Branch support was estimated with 1000 bootstrap replicates with five RAS per bootstrap replicate, with all other settings as above. The results were visualized in PAUP and exported as PDF files. In the initial MP analysis the best tree island was hit in 75% of the replicates and 36 equally most parsimonious trees were recovered. Although the most parsimonious trees differed in the reconstructed relationships of several backbone nodes of the tree, none of these were supported in a majority rule consensus of the bootstrap replicates.

The same alignment used for the MP analyses was then also subjected to Bayesian Inference (BI) analyses using MrBayes 3.1.2 (Huelsenbeck and Ronquist 2001). First the Akaike Information Criterion (AIC; Akaike 1973), as implemented in MrModeltest2.3 (Nylander 2004), was used to select GTR+I+G as the proper model of nucleotide substitution. The model settings were pasted directly into the Bayes block. The Markov Monte Carlo parameters consisted of 10,000,000 generations, with four chains, and a tree sampled every 100 generations. The initial 10,000 trees were discarded as burn-in and the results summarized as a 50% majority rule consensus tree that was visualized in FigTree (Rambaut 2009).

The alignment was prepared for maximum likelihood (ML) analysis by manually deleting the excluded regions, transforming the terminal gaps to missing data, and exporting the alignment as a PHYLIP formatted file. A rapid ML topology search and bootstrap analysis with 500 replicates was performed using the model GTRGAMMA in RAxML 7.2.6 (Windows executable; Stamatakis 2009) with the results of visualized in FigTree as for the Bayesian analysis above.

In order to examine the divergence between nrITS sequences, an additional alignment comprised of the newly generated ITS sequences was assembled in Mesquite. Sequences were aligned by hand and the terminal gaps were transformed to missing. A Jukes-Cantor distance matrix was then calculated in PAUP.

The alignment files used in the analyses described above are deposited in Dryad as doi: 10.5061/dryad.750p. GenBank accession numbers and associated voucher data are provided herein as Table 1.

RESULTS

In total 58 specimens were examined that appeared to represent the same sterile, asexually reproducing crustose lichen based on initial study in the field and herbarium. All of the populations examined in the field were found growing on shaded non-calcareous rock outcrops in forested habitats. Although typically found growing directly on flat and exposed portions of outcrops, the species was also occasionally found growing on vertical rock faces that were weakly inclined so as to be moderately sheltered. The specimens shared the morphological characters of having a thin to thick, greenish-gray, continuous to cracked thallus that developed abundant granular blastidia on the thallus surface, particularly along the cracks (Figure 1). Several specimens also produced what appeared to be sterile, immature apothecia that were immersed in the thallus and visible only as a small reddish-brown disc (Figure 2). Study with thin layer chromatography revealed the presence of atranorin

Table 1. GenBank accession numbers and relevant voucher data for newly generated sequences used in study.

	GenBank No.				
Taxon	nrITS	mtSSU	Isolate	Voucher	Locality
H. schuyleriana	KT823755		NY459	Lendemer 17296	U.S.A., Pennsylvania, Bradford Co.
H. schuyleriana	KT823756		NY469	Lendemer 17340	U.S.A., Pennsylvania, Bradford Co.
H. schuyleriana	KT823747		NY515	Lendemer 16587	U.S.A., Pennsylvania, Lycoming Co.
H. schuyleriana	KT823748		NY596	Lendemer 19843	U.S.A., Pennsylvania, Westmoreland Co.
H. schuyleriana	KT823751	KT823743	NY1017	Lendemer 25259	U.S.A., Pennsylvania, Union Co.
H. schuyleriana	KT823752	KT823742	NY1018	Lendemer 25366	U.S.A., Pennsylvania, Union Co.
H. schuyleriana	KT823753		NY1041	Lendemer 24811	U.S.A., Pennsylvania, Jefferson Co.
H. schuyleriana	KT823754	KT823744	NY1042	Lendemer 24843	U.S.A., Pennsylvania, Elk Co.
H. schuyleriana	KT823749	KT823745	NY1733	Lendemer 37666	U.S.A., Pennsylvania, Lycoming Co.
H. schuyleriana	KT823750	KT823746	NY1734	Lendemer 37806	U.S.A., Pennsylvania, Lycoming Co.

together with roccellic/angardianic acid in all specimens and infrequent traces of psoromic acid in a small number of specimens.

A total of five mtSSU sequences were generated for the aforementioned species from a selection of specimens collected between 2007 and 2013. There was no divergence observed amongst the mtSSU sequences (i.e., they were 99-100% identical). Initial MegaBLAST searches of the newly generated mtSSU sequences revealed a relationship with *Lepraria* in the Stereocaulaceae, and as such generic placement was evaluated using an mtSSU dataset that comprised Stereocaulaceae together with other families in the Cladoniineae as outlined by Miadlikowska et al. (2014). Analyses of this dataset are summarized in Figure 3, wherein the newly generated sequences form a clade (MP/ML/BI: 98/93/0.93) that was strongly supported by maximum parsimony and likelihood, but marginally supported by Bayesian Inference. The clade comprised of newly generated sequences was recovered in a strongly supported (98/97/0.99) sister relationship with *Herteliana gagei* (Sm.) J.R. Laundon [=*H. taylorii* (Salwey) P. James]. The clade comprised of *H. gagei* and the newly generated sequences was also recovered within a strongly supported (99/99/1.0) monophyletic Squamarinaceae, as sister to two species of the genus *Squamarina* that were also recovered as a strongly supported clade (95/93/1.0). The topology of the Cladoniineae recovered here generally conforms to that recovered by Miadlikowska et al. (2014), although little support was recovered for the backbone of the tree. Additionally *Hertelidea botryosa* (Fr.) Printzen

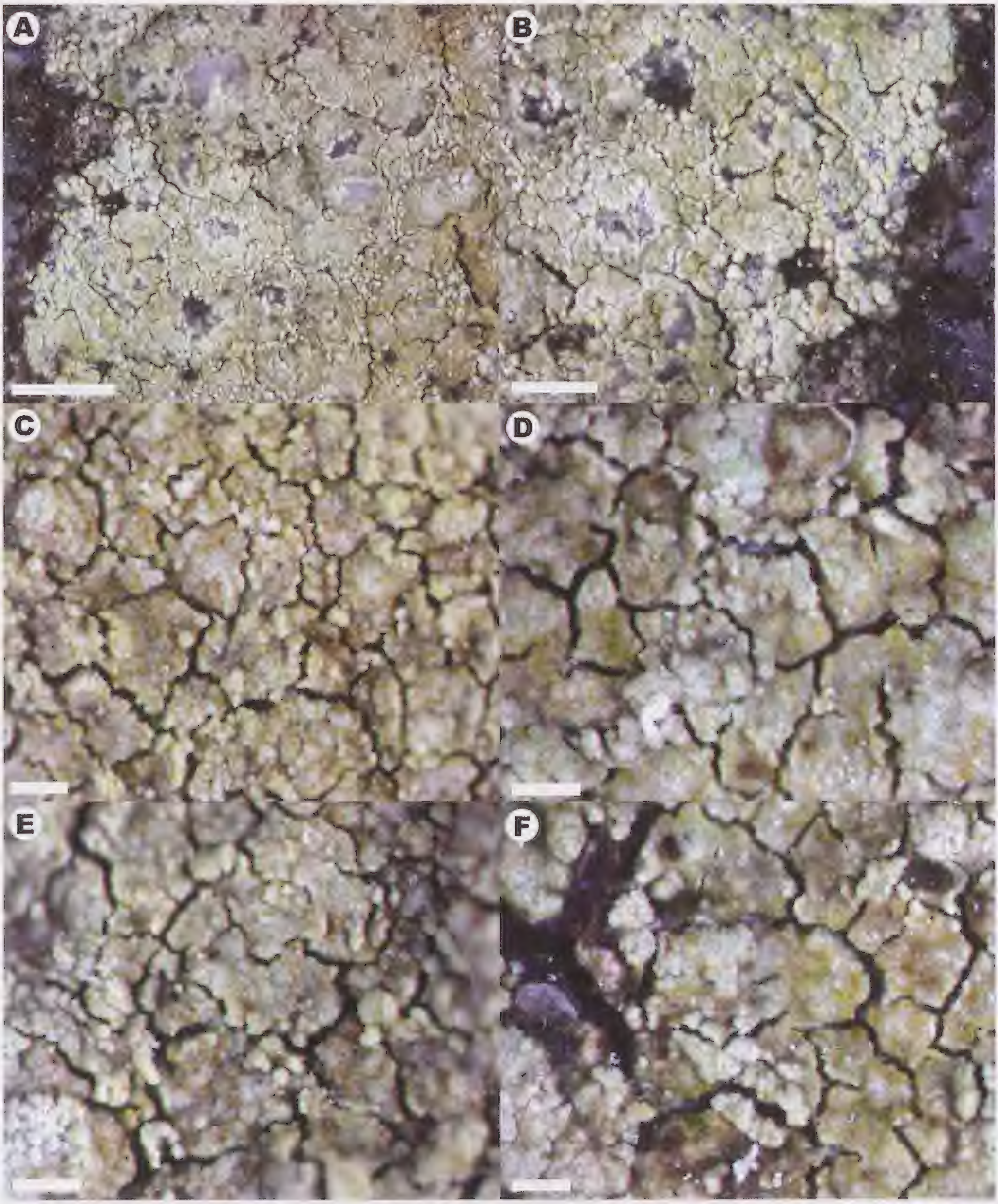

Figure 1. Morphology of thallus and lichenized diaspores of *Herteliana schuyleriana* (A and B from *Lendemer 16587*; C and E from *Lendemer 32189*, D and F from *Lendemer 19843*). A, gross morphology of the thallus. B, detail of thallus margin. C–D, detail of the blastidia. Scales = 1.0 mm in A, 0.5 mm in B, and 0.2 mm in C–F.

& Kantvilas was recovered on an isolated long branch outside of the Stereocaulaceae, albeit largely with weak support.

In order to further examine the monophyly recovered by mtSSU sequence data, and inferred from the shared chemical and morphological characters of the specimens examined,

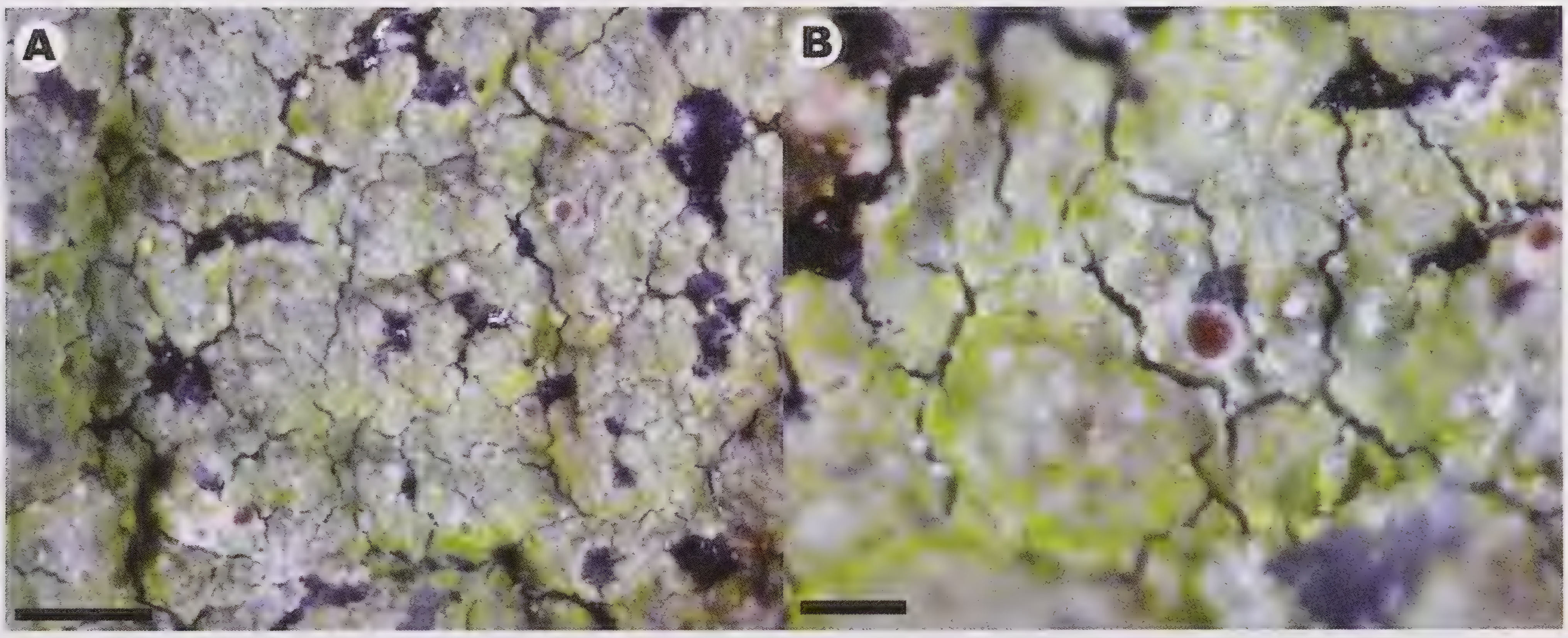

Figure 2. Immature apothecia in *Herteliana schuyleriana* (both from *Lendemer 37666*). A, morphology of thallus with several immersed apothecia. B, detail of immersed apothecium. Scales = 0.5 in A and 0.2 in B.

the divergence between ten nrITS sequences of the taxon was studied via calculation of a Jukes-Cantor distance matrix. Pairwise distances averaged 0.0053 (+/- a standard deviation of 0.0027), with the minimum distance recovered as 0 (i.e., sequences were 100% identical) and the maximum recovered as 0.0088. The divergence observed between nrITS sequences within the putative taxon is thus consistently well below the threshold typically observed between, versus within, species of lichen forming ascomycetes (Nilsson et al. 2008, Begerow et al. 2010, Del-Prado et al. 2010, 2011).

Based on the relationships discussed above, the taxon that is the focus of this study is supported as monophyletic and strongly supported as a member of the genus *Herteliana* embedded within the Squamarinaceae. Data from chemical, molecular and morphological lines of inquiry further support the hypothesis that the specimens examined comprise a single species within *Herteliana*. At present there are three described species of *Herteliana*, and the taxon studied herein is allopatric with these, as well as chemically and morphologically distinct from them. As such it is formally described as new to science below as *H. schuyleriana*.

Taxonomic Section

Herteliana schuyleriana Lendemer sp. nov.
Mycobank # 814547.

Diagnosis. – A unique member of the crustose lichen genus *Herteliana* differing from its congeners in its frequent lack of apothecia, the production of lichenized diaspores in the form of granular blastidia on the thallus surface, the production of roccellic/angardianic acid together with atranorin, and in occurring on shaded non-calcareous at inland (vs. maritime) areas of the the Appalachian Mountains of eastern North America.

TYPE: **U.S.A. PENNSYLVANIA, LYCOMING CO.:** Tiadaghton State Forest, Miller Run Natural Area, slopes above Left Fork of Miller Run, ~0.5 mi N of Browns Run Rd.,

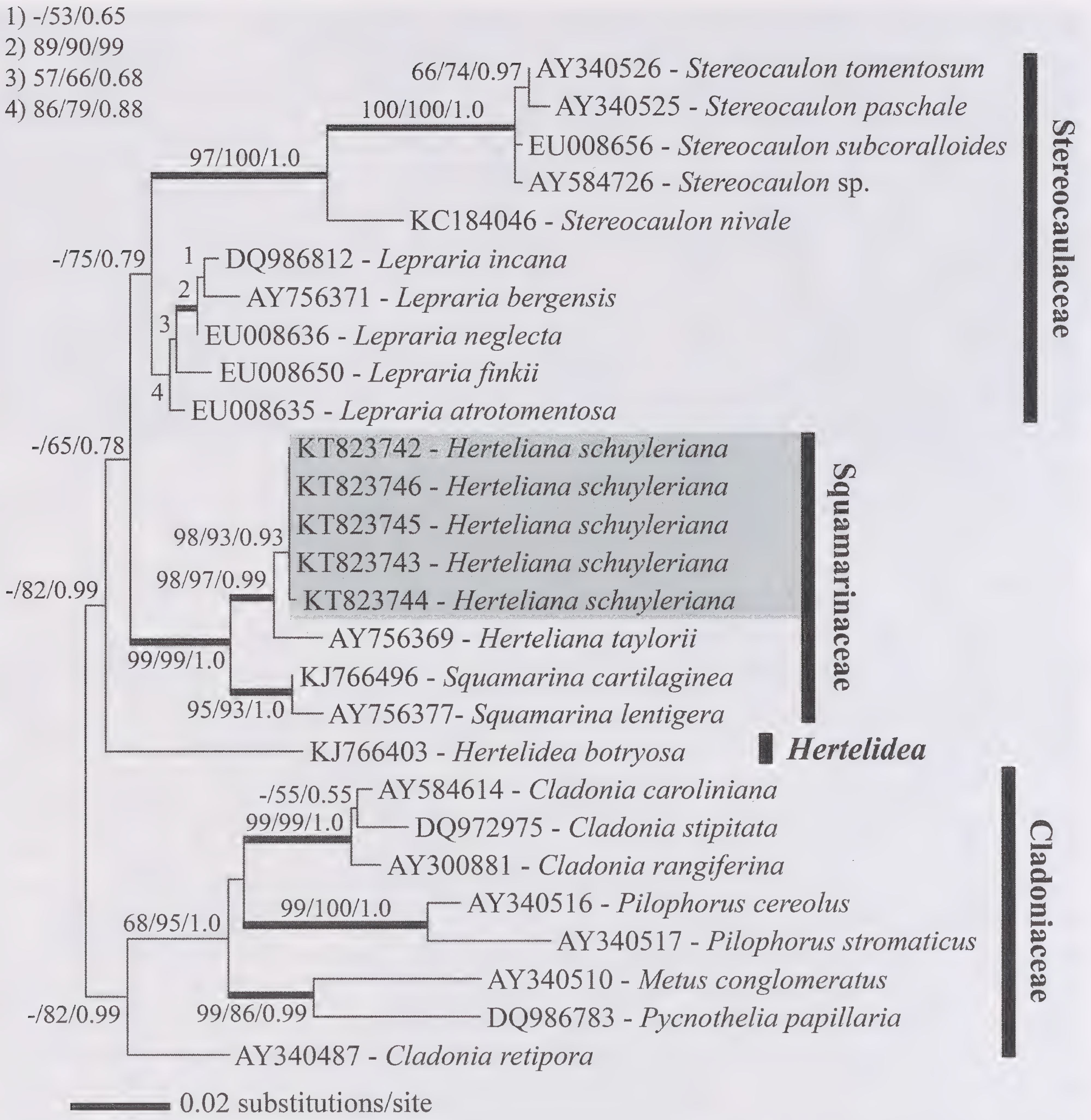
1) -/53/0.65
2) 89/90/99
3) 57/66/0.68
4) 86/79/0.88
66/74/0.97
AY340526 - Stereocaulon tomentosum
100/100/1.0
AY340525 - Stereocaulon paschale
EU008656 - Stereocaulon subcoralloides
97/100/1.0
AY584726 - Stereocaulon sp.
KC184046 - Stereocaulon nivale
-/75/0.79
1
DQ986812 - Lepraria incana
2
AY756371 - Lepraria bergensis
3
EU008636 - Lepraria neglecta
EU008650 - Lepraria finkii
4
EU008635 - Lepraria atrotomentosa
Stereocaulaceae
-/65/0.78
KT823742 - Herteliana schuyleriana
KT823746 - Herteliana schuyleriana
98/93/0.93
KT823745 - Herteliana schuyleriana
KT823743 - Herteliana schuyleriana
98/97/0.99
KT823744 - Herteliana schuyleriana
-/82/0.99
AY756369 - Herteliana taylorii
99/99/1.0
KJ766496 - Squamarina cartilaginea
95/93/1.0
AY756377- Squamarina lentigera
Squamarinaceae
KJ766403 - Hertelidea botryosa
Hertelidea
-/55/0.55
AY584614 - Cladonia caroliniana
99/99/1.0
DQ972975 - Cladonia stipitata
AY300881 - Cladonia rangiferina
99/100/1.0
AY340516 - Pilophorus cereolus
68/95/1.0
AY340517 - Pilophorus stromaticus
AY340510 - Metus conglomeratus
-/82/0.99
99/86/0.99
DQ986783 - Pycnothelia papillaria
AY340487 - Cladonia retipora
Cladoniaceae
0.02 substitutions/site

Figure 3. Phylogeny of Squamarinaceae and related families within the Cladoniineae, with Cladoniaceae selected as the outgroup, inferred from mtSSU sequence data and displayed as the most likely tree. Support was evaluated using maximum parsimony (MP) and maximum likelihood (ML) bootstrap proportions (BP) and Bayesian posterior probability (B-PP). Support values are displayed at each node in the following format: MP-BP/ML-BP[PAUP]/ML-BP[RAxML]/B-PP. Thickened branches are those that were recovered with MP-BP support ≥70%, ML-BP support ≥70% and BI-PP support ≥0.95.

1833 ft., second growth *Quercus prinus-Acer rubrum-A. pensylvanicum* forest with *Kalmia-Hamamelis* understory, 15 May 2013, on rock, *Lendemer et al. 37806* (NY!, holotype)

Description. – **Thallus** saxicolous, crustose, forming extensive colonies multiple centimeters to meters in extent, thin to thick, continuous to cracked and +/− areolate, blastidiate; **upper surface** dull, irregular, coarse and lumpy, greenish-blue to yellowish-blue; **prothallus** pale,

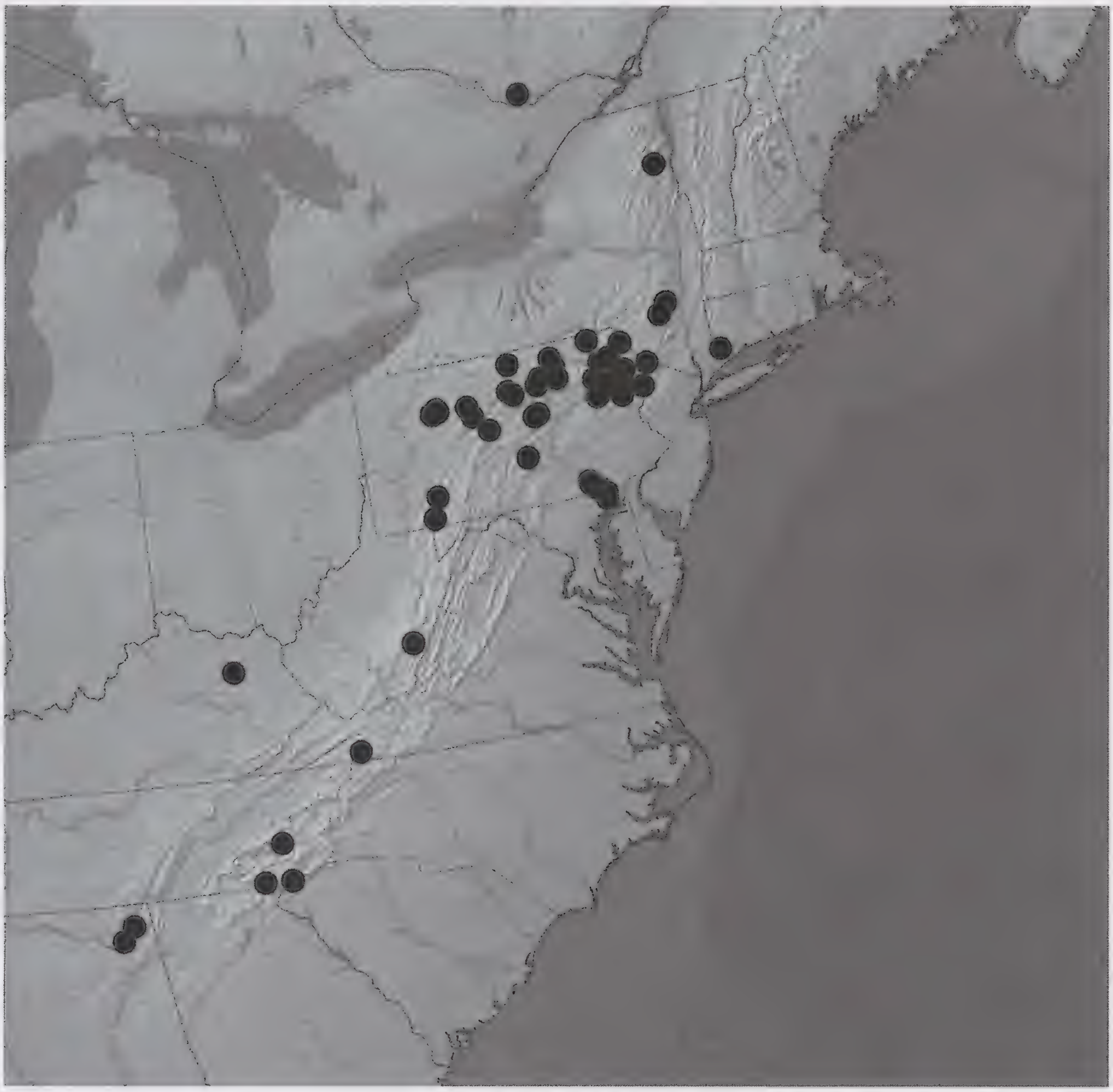

Figure 4. Geographic distribution of *Herteliana schuyleriana* as presently known based on specimens examined for this study.

indistinct, visible as a whitish film near the margins of the thallus and between the areoles before they become densely aggregated and overlapping; **upper cortex** 10-15 µm thick, hyaline, poorly developed, a thin layer of irregularly oriented and heavily gelatinized fungal hyphae 1.8-3.0 µm wide, with POL+ crystals; **medulla** 80-150 µm thick, a densely packed network of irregularly intertwined fungal hyphae and algal cells, without POL+ crystals; **blastidia** abundant, coarse, short and granular, ~0.01-0.05 mm in diameter, rarely becoming +/− elongate, budding along cracks in the surface of the thallus, the margins of the areoles, and occasionally from the upper surface; **apothecia** not seen, however some specimens appear to have poorly developed, immature apothecia that are immersed in the thallus and visible as small reddish-brown discs; **pycnidia** not seen.
Photobiont coccoid green alga, cells globose, 5.5-8.0 µm in diameter.

Chemistry. – Atranorin, roccellic/angardianic acid, +/− psoromic acid as a trace or minor accessory. Spot tests: K+ yellow, KC-, C-, P+ weak to strong yellow, UV-.

Etymology. – The new species is named in honor of Dr. Alfred ("Ernie") Schuyler (b. 1935), curator emeritus of the Department of Botany at The Academy of Natural Sciences of Philadelphia (PH). Ernie served as my mentor during a formative period in my career, and remains a colleague and friend. He has many specialties including the taxonomy of the genus *Scirpus*, ecology and systematics of intertidal plants, early-American botanical history, and philosophy. In addition to working together in the field and herbarium for nearly a decade, we co-founded the long-running weekly Botany Happy Hour at PH which eventually evolved into the formal "Stamen and Pistil", a collaborative, synergistic event that fosters a diverse exchange of ideas between scientists, artists, philosophers and many other groups. Although Ernie already is honored with a rare eastern North American lichen (*Vezdaea schuyleriana* Lendemer, Lendemer 2011) it seemed appropriate to name another more frequent and readily visible taxon in his honor so that others can think of him fondly as they explore the forests of Pennsylvania and the Appalachian Mountains.

Ecology and distribution. – Based on the available data, *Herteliana schuyleriana* appears to be endemic to the Appalachian Mountains of eastern North America where it is widespread from New York south to Alabama (Figure 4). The highest concentrations of the species are in the central Appalachian Mountains, particularly Pennsylvania, where the species is a characteristic member of saxicolous lichen communities on the exposed faces of shaded non-calcareous rocks in forested habitats. The most frequent associates are other saxicolous lichens that are common and widespread such as *Porpidia albocaerulescens* (Wulfen) Knoph & Hertel, *Rhizocarpon infernulum* f. *sylvaticum* Fryday and *Rinodina tephraspis* (Tuck.) Herre. Interestingly, *H. schuyleriana* rarely if ever grows on sheltered rock faces or overhangs, which are protected microhabitats often occupied by other sterile asexually reproducing crustose lichens such as *Lepraria* Ach.

Discussion. – The genus *Herteliana* was initially described to accommodate *H. taylorii*, a crustose lichen that has a pale gray thallus, immersed to sessile, convex, lecideine apothecia, relatively small, simple ascospores that form in *Bacidia*-type asci, lacks sorediate or other lichenized diaspores, and produces atranorin together with confluentic acid and related substances (Hawksworth et al. 1990, Hawksworth 1992, Fryday 2004). Subsequently Laundon (2005) resurrected the name older name *H. gagei* for the taxon that had previously been called *H. taylorii*.

Herteliana remained monospecific until Ekman (1999) recognized an additional species from northwestern North America, *H. alaskensis* (Nyl.) S. Ekman, which differed from *H. gagei* primarily in having a darker brown thallus and in the absence of atranorin and other secondary compounds. Another species, *H. australis* Fryday, was then also described from the Southern Hemisphere by Fryday (2004). That species differed from *H. gagei* in producing only atranorin, and in having consistently immersed rather than sessile apothecia.

Thus, at the time of this study *Herteliana* comprised three species, all of which lack lichenized diaspores and occur on non-calcareous rocks in coastal maritime habitats in regions with oceanic climates (see Ekman 1999, Fryday 2004). As such, the species described herein is readily distinguished from the three species of *Herteliana* already described (*H. alaskensis, H. australis* and *H. gagei*) by its granular-blastidiate thallus, lack of sexual fruiting bodies, and production of roccellic/angardianic acid together with atranorin. The new species is also allopatric with its congeners, occurring on shaded non-calcareous rocks in forested habitats of inland areas of the Appalachian Mountains of eastern North America.

In addition to the three species of *Herteliana* discussed above, *Lecidea phaeops* Nyl. is another species that is morphologically similar to *H. gagei* and other members of the genus. It occurs in oceanic regions of the northern hemisphere (e.g., Inoue 1988) and is similar to *H. schuyleriana* in producing atranorin and psoromic acid. Nonetheless, *L. phaeops* readily differs from the new species in having a smooth, continuous thallus with abundant immersed black apothecia rather than a cracked thallus that is typically sterile and always produces abundant blastidia. Further, although psoromic acid is produced in *H. schuyleriana*, it is only present as an infrequent minor accessory to atranorin and roccellic/angardianic acid, the latter of which is not produced by *L. phaeops*.

In the field *Herteliana schuyleriana* most likely has been frequently overlooked due to its sterility and inconspicuous lichenized diaspores. This issue is further compounded by the fact that it often occurs in mixed communities of saxicolous lichens which produce abundant apothecia, and cursory examination of *H. schuyleriana* would likely lead many to assume that it was merely a sterile thallus of another much more common species. It should be noted however, that within the habitats where it occurs, *H. schuyleriana* is readily identifiable even from a distance based on the greenish-gray color of the thallus, typical absence of apothecia, and occurrence on the exposed faces of rocks in shaded forests (vs. the overhangs or sheltered faces where most asexually reproducing lichens occur). To put it simply, *H. schuyleriana* hides in plain sight, and once learned cannot readily be confused with any other sympatric crustose lichen.

Selected specimens examined. **CANADA. QUEBEC, PONTIAC CO.:** Gatineau Park, Church Hill, 0.3-0.5 mi E of parking area on Chemin Eardley Masham, 22 May 2011, on rock, *Lendemer 28347 & Freebury* (NY). **U.S.A. ALABAMA, JACKSON CO.:** Buck's Pocket State Park, along South Sauty Creek, 3 Oct 1998, on rock, *Harris 42383* (NY); Pisgah, Jones Cove below Pisgah Civitan Park, 2 Oct 1999, on rock, *Harris 43348* (NY). **CONNECTICUT, FAIRFIELD CO.:** Town of Redding, Highstead Arboretum, 9 Jun 2005, on rock, *Harris 51590* (NY). **KENTUCKY, BATH CO.:** Daniel Boone National Forest, Stoney Cove Recreation Area, 10 Oct 1995, on rock, *Harris 36935* (NY). **MARYLAND, CECIL CO.:** New Valley, along Basin Run, Liberty Grove Rd. ~0.2 mi N of jct w/ Dr. Jack Rd., 1 Dec 2009, on rock, *Lendemer 20007* (NY). **HARFORD CO.:** Susquehanna State Park, slopes above confluence of stream and Susquehanna River, 0.5 mi N of Rock Run, 1 Dec 2009, on rock, *Lendemer 19995* (NY). **NEW YORK, ESSEX CO.:** SW side of Chapel Pond, SW of NY73, 19 Sept 2004, on rock, *Lendemer 3018 et al.* (NY). **GREENE CO.:** Town of Hunter, Catskill Forest Preserve, Stony Clove Notch on W side of NY214, 13 Sept 2008, on rock, *Lendemer 14050* (NY). **ULSTER CO.:** trail to Giant Ledge from CR47, 5 mi SSE of Big Indian, 13 May 1994, on rock, *Harris 32786* (NY). **NORTH CAROLINA. HAYWOOD CO.:** Great Smoky Mountains National Park, Double Gap Trail between Double Gap and Caldwell Fork, 8 Oct 2011, on rock in overhang, *Tripp et al. 2109* (NY). **JACKSON CO.:** Nantahala National Forest, trail from Whitewater Falls overlook down to Whitewater River, 14 Sept 1996, on rock, *Harris 38626* (NY). **MACON CO.:** Nantahala National Forest, end of FS763, along Jones Creek, 3 Oct 1997, on rock, *Harris 41185* (NY). **PENNSYLVANIA, BRADFORD CO.:** State Game Lands #36, Falls Creek, 1 mi N of confluence with Schrader Creek, 18 May 2009, on rock, *Harris 55173* (NY); State Game Lands #12, E shore of Sugar Run, ~2 mi S of confluence w/ Schrader Creek, 18 May 2009, on rock, *Harris 55196* (NY). **CENTRE CO.:** Moshannon State Forest, Benner Run Rd. 1.25-1.5 mi E of jct w/ Huckleberry Rd., 3 Sept

2010, on rock, *Lendemer 24489-A* (NY). **CLEARFIELD CO.:** Moshannon State Forest, Merrill Rd. ¼ mi N of jct w/ Caledonia Pike, 30 Aug 2010, on rock, *Lendemer 23765* (NY). **ELK CO.:** E shore of Chase Run 0-0.5 mi N of parking area on Trout Run Rd., 1 Sept 2010, on rock in overhang, *Lendemer 24252* (NY); Allegheny National Forest, Church Run 0-0.25 mi N of confluence w/ Clarion River, above River Rd., 8 Sept 2010, on rock, *Lendemer 24843* (NY). **FAYETTE CO.:** Ohiopyle State Park, along the Great Allegheny Passage paralleling the Youghiogheny River, 28 Apr 2012, on rock, *Harris 57408* (NY). **JEFFERSON CO.:** Clear Creek State Park, Phyllis Run 0.25 to 0.75 mi N of confluence w/ Clear Creek, 8 Sept 2010, on rock, *Lendemer 24807* (NY); Clear Creek State Forest, Corbet Rd. 0.5 mi S of jct w/ PA949, 8 Sept 2010, on rock, *Lendemer 24811* (NY); State Game Lands #54, Spring Creek Rd. 0.75 mi N of jct w/ PA949, 8 Sept 2010, on rock, *Lendemer 24860* (NY). **LACKAWANNA CO.:** Merli-Sanroski County Park, 17 Jul 2008, on rock, *Lendemer 13200* (NY). LANCASTER CO.: Ferncliff Wildflower and Wildlife Preserve, 28 Jul 2009, on rock, *Lendemer 18706* (NY); Kellys Run Gorge Preserve, Kellys Run Gorge, 29 Jul 2009, on rock, *Lendemer 18784* (NY); Tucquan Glen Preserve, N slopes of ravine along Tucquan Creek, 8 Aug 2009, on rock, *Lendemer 19300* (NY). **LUZERNE CO.:** Nescopeck State Park, S of Honey Hole Rd., 20 Apr 2005, on rock, *Lendemer 4027 & Macklin* (NY); Frances Slocum State Park, Lakeshore Trail between parking areas on N shore of Frances Slocum Lake, 3 May 2012, on rock in overhang, *Lendemer 32189 & Golinvaux* (NY). **LYCOMING CO.:** Tiadaghton State Forest, Francis Rd. 2 mi S of county line, 15 May 2009, on rock, *Lendemer 17084* (NY); Tiagahton State Forest, S-facing slopes above Rock Run, along Rock Run Rd. ~2 mi E of PA14/town of Ralston, 12 May 2009, on rock, *Lendemer 16587 & Atha* (NY); Tiadaghton State Forest, Trout Run Rd. ~0.5 mi S of jct w/ Little Boyer Rd., 15 May 2009, on rock, *Lendemer 17035* (NY). State Game Lands #133, E shore of Lycoming Creek, N-facing slopes of Batys Mountain between Debois Hollow and Shoemaker Run, 12 May 2009, *Lendemer 16643 & Atha* (NY). **MIFFLIN CO.:** Bald Eagle State Forest, N shore of Treatser Run, E of Bigelow Ridge Trail, 14 Sept 2010, on rock, *Lendemer 25442* (NY). **MONROE CO.:** Tobyhanna State Park, margins of Palen Swamp and lower slopes of Kistler Ledge, 27 Mar 2004, *Lendemer 2085 & Macklin* (NY); State Game Lands #38, Hypsy Gap, W of Hypsy Gap Rd., 2 May 2005, on rock, *Lendemer 4076 & Macklin* (NY); Delaware Water Gap National Recreation Area, ~2 mi S of Bushkill, Community Drive Wetlands, 17 Sept 2007, on shaded rock, *Lendemer 4961 et al.* (NY). **PIKE CO.:** State Game Lands No. 209, terminus of Pond Eddy / Firetower Rd., 28 Jul 2009, on rock, *Lendemer 18651* (NY). **SULLIVAN CO.:** Worlds End State Park, along Mineral Spring Rd. ~¼ mile from int w/ PA154, 18 Apr 2004, on rock, *Lendemer 2198 & Macklin* (NY); Worlds End State Park, along Loyalsock Rd., 28 Oct 2005, on rock, *Lendemer 5278 & Macklin* (NY). **SUSQUEHANNA CO.:** Salt Springs State Park, slopes above S shore of Fall Brook, 8 Jul 2009, on rock, *Lendemer 12789* (NY). **TIOGA CO.:** Tioga State Forest, Asaph Wild Area, Black Ash Swamp, 11 May 2009, on rock, *Lendemer 16442 & Atha* (NY). **UNION CO.:** Bald Eagle State Forest, N-facing slopes above Spruce Run, 13 Sept 2010, on rock, *Lendemer 25366* (NY); Bald Eagle State Forest, S slopes of Sand Mountain, Halfway Run Natural Area, 13 Sept 2010, on rock, *Lendemer 25259* (NY). **WAYNE CO.:** State Game Lands No. 159, vicinity of The Notch, 2 Jul 2008, on rock, *Lendemer 12356* (NY). **WESTMORELAND CO.:** Powdermill Run Nature Preserve, S slopes of Powdermill Run, 20 Oct 2009, on rock, *Lendemer 19843* (NY). **YORK CO.:** State Game Lands #83, S shore of Sawmill Run along Sawmill Rd., 9 Aug 2009, on rock, *Lendemer 19373* (NY); Apollo County Park, N section via Boyd Rd. Access, Mason Dixon Trail along Wilson Run to confluence with Susquehanna River, 9 Aug 2009, on rock, *Lendemer 19441* (NY). **VIRGINIA, GRAYSON CO.:** Jefferson National Forest, Mount Rogers Recreation Area, Comer's Creek Falls, 5 Apr 2008, on rock, *Hodkinson 8989* (DUKE). **WEST VIRGINIA, POCAHONTAS CO.:** Watoga State Park, Jesse's Cove Trail, 30 Sept 2000, on rock, *Harris 43970* (NY).

Conclusion

The description of *Herteliana schuyleriana* adds to the continuing number of species new to science that have been formally described following recent biodiversity inventory efforts the Appalachian Mountains of eastern North America (e.g., Lendemer 2007, 2009, 2012; Lendemer et al. 2008, 2012; Sheard et al. 2012, Lendemer and Harris 2013a, 2013b, 2014; Harris et al. 2014, Allen and Lendemer 2015, Allen and McMullin 2015). Although the southern Appalachians have long been recognized as a biodiversity hotspot for many groups of organisms including lichens (Braun 1950, Little 1971, 1977; Brodo et al. 2001, Lendemer and Tripp 2008, Lendemer et al. 2013), rare and endemic lichen species also occur in the central Appalachians (Lendemer 2005, 2006; Fryday et al. 2007, Harris and Lendemer 2011b) and even northern Appalachians (Hinds et al. 2002, 2009; Ihlen and Fryday 2002, Fryday 2006). The discovery of previously unknown lichen species such as *H. schuyleriana*, in a region that has both been the subject of lichenological investigation for more than two centuries, and also greatly impacted by anthropogenic forces, highlights the extent of biodiversity that remains to be discovered and the urgent need to document it in the face of the current extinction crisis (Tripp and Lendemer 2012).

Acknowledgements

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The Vascular Plants of Camp Dark Waters, Medford, New Jersey, 1912 to 2015

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INTRODUCTION

Camp Dark Waters is a 15-acre Quaker children's camp located in Medford Township, New Jersey, one mile northeast of downtown Medford. Most of the camp is woodland, including swampy woods, upland woods, and woods bordering the east bank of the southwest branch of the Rancocas Creek. The camp is along the upper reach of an impounded waterway known as Lake Catoxen at Kirby's Mill dam. The woodland is part of the oak-pine fringe that is just west of the New Jersey Pine Barrens.

Decades prior to the establishment of the camp, the property was used by Witmer Stone, who held posts at the Academy of Natural Sciences of Philadelphia from 1893 to 1938, and several of his colleagues (McConnell 2014). As a base of operations from which to explore the botany and ornithology of southern New Jersey, Stone and four friends used a cabin that they built there in 1899 (McConnell 2014). Photographs of the cabin, which Stone called "Catocksin Camp" on his early herbarium labels and "Catoxen Cabin" on later labels (See Appendix 2 for spelling variants of Catoxen), were published in *Cassinia* in 1908 (Morris 1908), and one of these photographs (Figure 1) is also reprinted in Scott McConnell's biography of Witmer Stone (McConnell, 2014). It is clear from these photographs that the cabin used by Witmer Stone is the cabin now called "Arapahoe" at Camp Dark Waters (Figure 2). Because Stone thoroughly documented his discoveries, a comparison can therefore be made of the plants currently found at Camp Dark Waters with those found by Witmer Stone in the same vicinity approximately one hundred years ago.

METHODS

The senior author conducted a survey of the trees of a portion of Camp Dark Waters in 1992, and then made a more comprehensive list of the trees in that part of the camp in 2010. The authors also conducted eight field trips to Camp Dark Waters between April 2006 and July, 2015. Most of the plants in this checklist were identified without collecting and preserving a reference specimen.

RESULTS AND DISCUSSION

In 1912 Witmer Stone distributed *The Plants of Southern New Jersey* (Stone 1911), "the only comprehensive floristic treatment for southern New Jersey, and it continues to be used today" (Moore 2002). In that flora, Witmer Stone considered there to be 1373 species of vascular plants on the coastal plain of New Jersey. For each of the species, Stone listed the

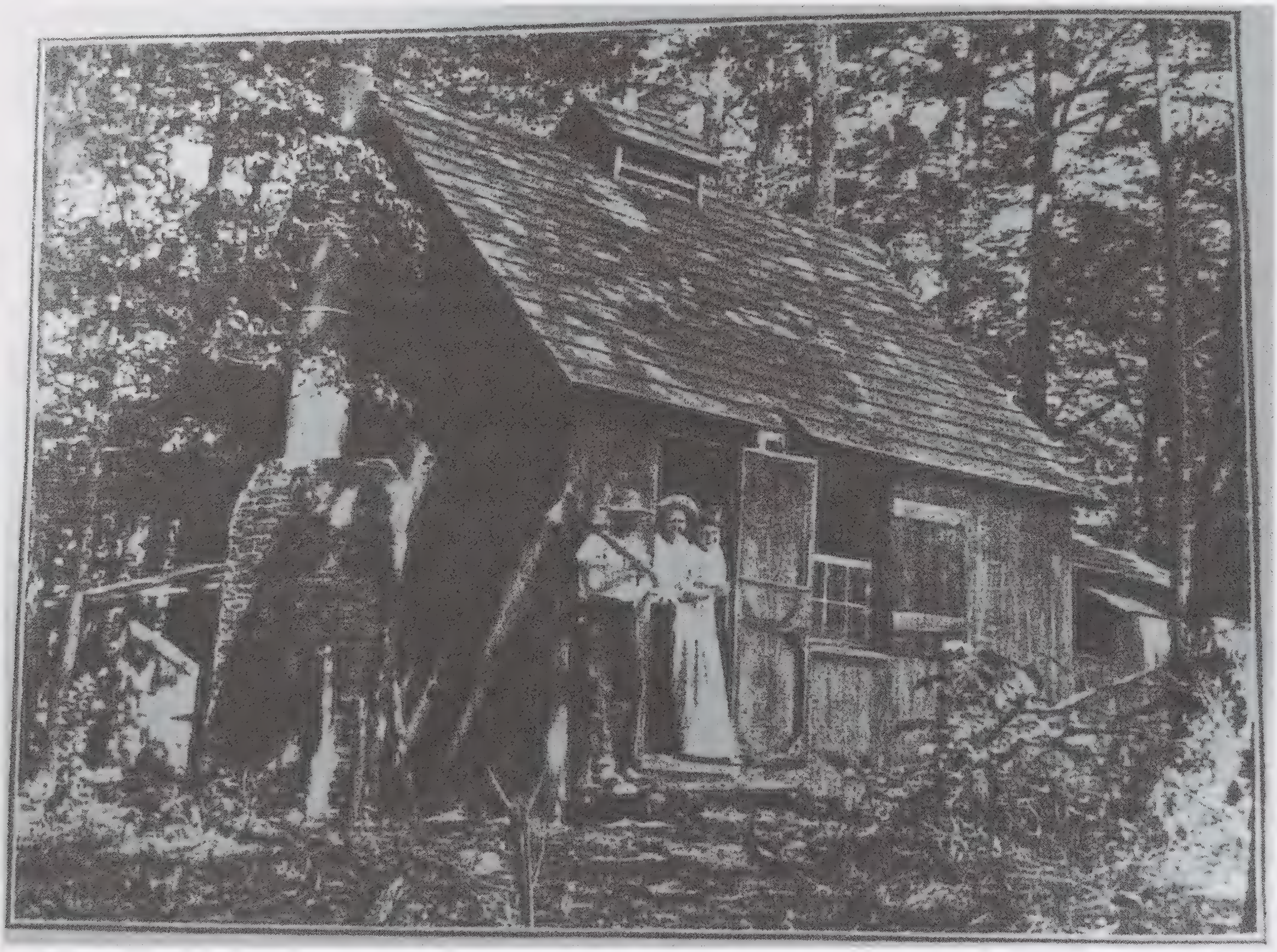


Figure 1. Photo of Catoxen Cabin between 1899 and 1908.

localities in which he found the plants, based on herbarium specimens found in the herbaria of the Academy of Natural Sciences of Philadelphia, the New Jersey State Museum, the New York Botanical Garden, and numerous other smaller herbaria (Stone 1911). Stone grouped the localities into four districts that he called "Middle District", "Pine Barrens", "Coastal Strip", and "Cape May." Medford was in Stone's "Middle District", and he documented approximately 327 species of vascular plants that had been found in Medford, New Jersey by various collectors at some time up to 1911. Of these 327 species, Stone himself collected specimens representing approximately 261 species in Medford. During our field investigations, we compiled a list of 141 species of vascular plants, including nine specimens that we identified only to the genus level (see checklist in Appendix 1).

Judging by Stone's specimen numbers now housed in the herbarium of the Academy of Natural Sciences of Philadelphia, Stone personally collected more than 16,000 herbarium specimens, mostly from Pennsylvania and New Jersey. Stone gave many specimens directly to the herbarium of the Academy of Natural Sciences of Philadelphia (PH), and his personal herbarium was given to the University of Pennsylvania (Pennell, 1943). In the early 1970s, the University's entire herbarium was passed on to the Academy of Natural Sciences herbarium (PH).

How many of the 327 species that Stone found in Medford, New Jersey were growing at Camp Dark Waters when Stone was collecting there (circa 1899-1910)? We cannot answer this question precisely, but by comparing the list of 327 species with herbarium sheets found at the Academy today, we can get a fairly accurate idea. We have examined 72 herbarium

Figure 2. Photo of Arapahoe Cabin at Camp Dark Waters taken by John Braxton in 2015.

specimens at PH collected by Witmer Stone in Medford, representing 70 of the species that are currently growing at Camp Dark Waters. Of these 72 specimens, 69 bear labels indicating either “Flora of Catocksin Camp” (Figure 3) or “Vicinity of Catoxen Cabin, 1 mi. n.e. of Medford” (Figure 4). Three specimens were found that simply said “Medford”, which could mean that they were collected from a different location near Medford. However, closer examination found that two of those three specimens with labels saying “Medford” were duplicate collection numbers with specimens that were labeled either “Catocksin” or “Catoxen”. Thus, at least 69 of the 70 specimens (99%) representing species currently growing in Medford were collected by Stone at or near the site Camp Dark Waters.

Because we currently identify 141 species of vascular plants found at Camp Dark Waters, compared with Stone’s 327 species from Medford, we wondered if the species that Stone identified as growing at “Medford” were found in localities other than Camp Dark Waters that are near Medford. We examined 61 randomly-selected herbarium specimens collected in Medford by Stone, representing species that are not currently found growing at Camp Dark Waters. Of these, 58 (95%) also came from “Catocksin” or ”Catoxen”. The remaining 3 specimens were simply labeled “Medford”. Because we know some of Stone’s specimens labeled “Medford” were duplicates of specimens collected at Camp Catoxen, it is possible that all of Stone’s specimens labeled “Medford” were collected in the vicinity of Camp Catoxen. Even if some of Stone’s specimens labeled “Medford” were not collected at Camp Catoxen, it is likely that nearly all of the 261 species that Stone collected in Medford one hundred years ago were found in the vicinity of what is now Camp Dark Waters.

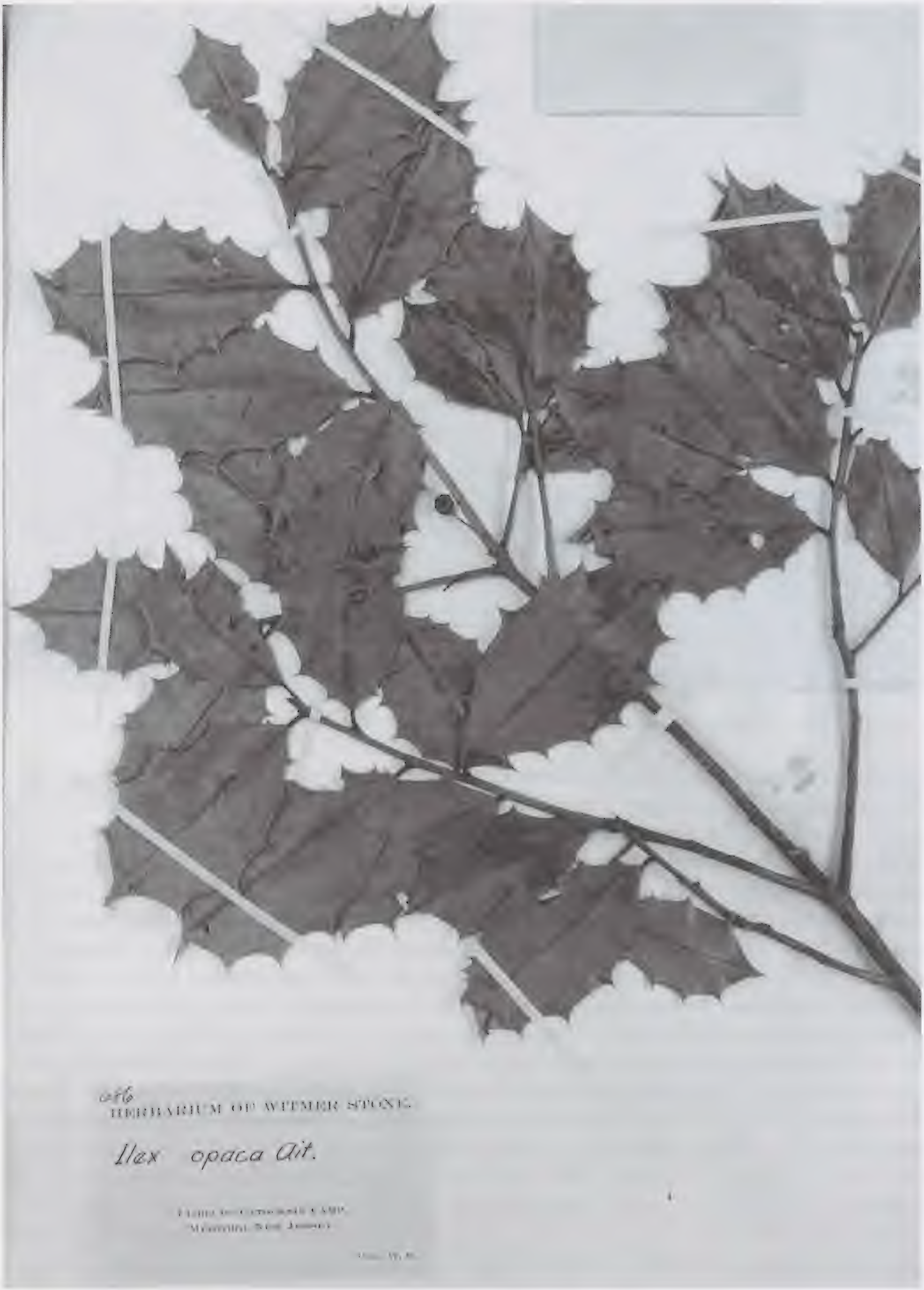
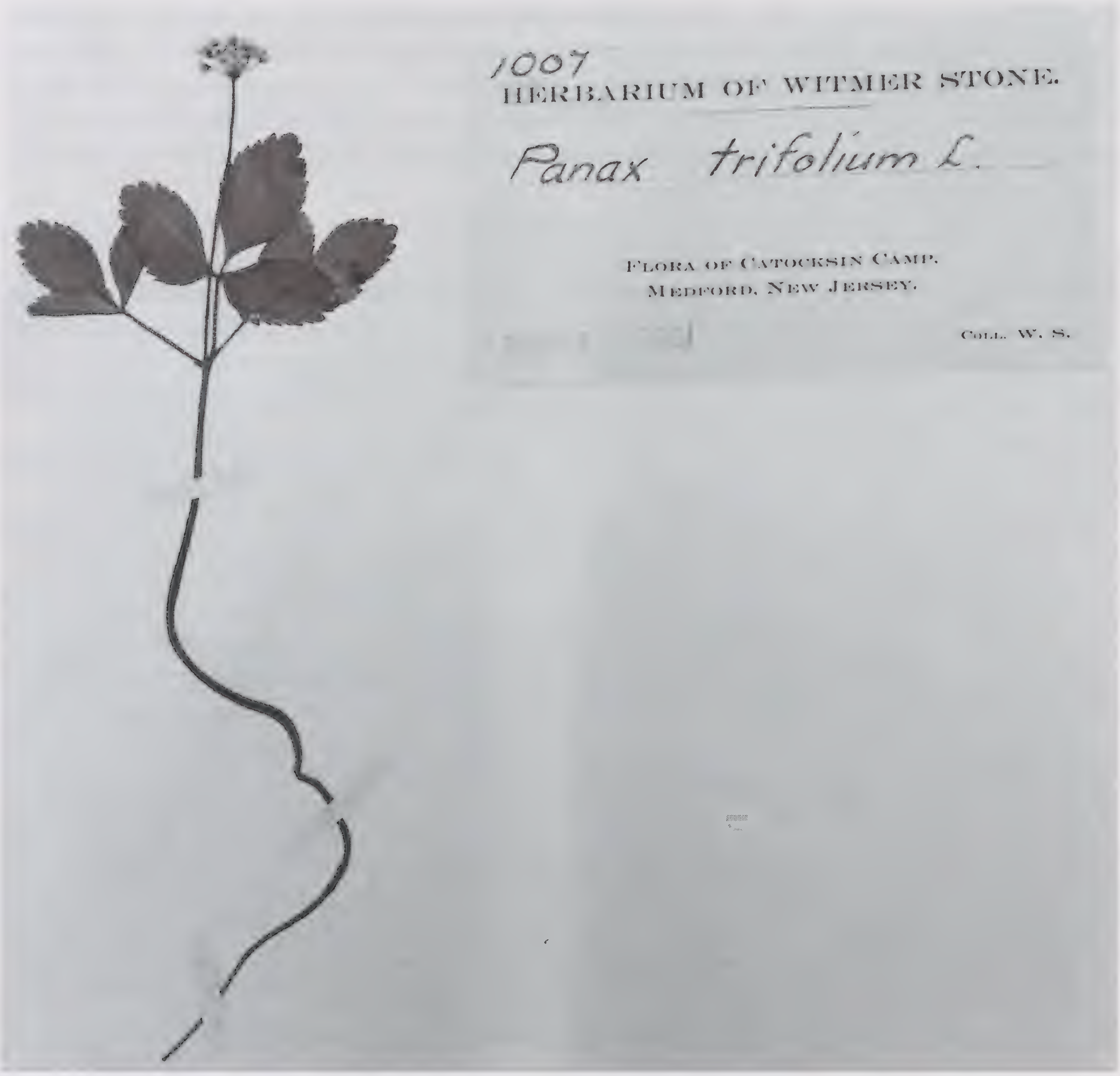


Figure 3. Label from one of Witmer Stone's early herbarium specimens (ca. 1898-1900) collected at what Stone called "Catocksin Cabin", now called Camp Dark Waters.



1007
HERBARIUM OF WITMER STONE.
Panax trifolium L.
FLORA OF CATOCKSIN CAMP.
MEDFORD, NEW JERSEY.
COLL. W. S.

Figure 4. Label from one of Witmer Stone's later (1901) herbarium specimens, in which he changed the spelling from "Catocksin" to Catoxen. Sometime in 1900 Stone began putting his collection dates on his labels.

Why were there 261 species in the vicinity of Camp Dark Waters in 1911 and only 141 one hundred years later? There are undoubtedly several contributing factors. One factor is the change in habitat due to ecological succession. George Spencer Morris, an architect who designed "Catoxen Cabin", described the location of the cabin as containing "a grove of taller pine crowning a little knoll which rose somewhat steeply from the bottoms bordering the stream. At the foot of the knoll bubbled a clear strong spring." One of these pines is visible in the photo of Catoxen Cabin taken by Witmer Stone and published by Morris in *Cassinia* (Morris 1908). The knoll remains, but today there are no pines on the knoll, having been replaced by oaks and beeches whose seedlings survive better in shade than pine seedlings do, especially when there is no fire to eliminate competition and cause the pine cones to open. Openings in the canopy caused by death of the older trees are quickly filled by fast-growing tulip poplars. The first author of this article can remember coming to the camp in the 1950's and 1960's when the gray birches (*Betula populifolia*) that Stone found at the camp were common. Today there are no gray birches at the camp. Undoubtedly a change in the canopy and subcanopy trees also results in a change in the herb and shrub layers, with a possible decline in the number of species. (The spring at the camp, incidentally, still bubbles strongly!)

A second factor in the change in the species composition is the change in the land use by humans bordering the camp. Witmer Stone described old fields "just east of us" (Stone 1908). Between Stone's day and now, these old fields became cornfields, witnessed by the first author when he was a child at Camp Dark Waters, and then became housing developments bordering the camp. Stone's collection area in the vicinity of Catoxen Cabin was certainly larger than the current Camp Dark Waters property, for his collecting area included those fields that are now gone. The first author's many visits to the camp suggest that the large numbers of meadowlarks, killdeers, and indigo birds that Stone described inhabiting these fields are gone, along with some of the plant species that protected and fed them.

A third factor causing the decline in the number of species at the camp is the heavy use by campers and their counselors of much of the 15 acres. Since 1927 "Camp Catoxen" has been "Camp Dark Waters". During July and August the camp is home to 80-100 active young people playing capture-the-flag, finding wood for campfires and other outdoor activities. This has been a wonderful outdoor experience for thousands of city dwellers, and has provided the opportunity for many nature hikes and bird walks—but it certainly has not helped the diversity of the flora! Our study of the trees in the most heavily-used part of the camp indicates that the trees in this part are not able to re-seed, and significant numbers of the mature trees are dying. Certain early-succession species such as *Juniperus virginiana* are now rare. Deliberate planting of native trees has begun to replace the mature trees that have been lost. In the areas that are protected from heavy foot traffic, new seedlings are healthy and growing. The number of tree species is the same today as it was in 1992, though the number of individual mature trees is significantly reduced.

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APPENDIX 1

Checklist of the vascular plants currently growing at Camp Dark Waters, Medford Township, New Jersey[1].

Aceraceae – Maple Family	
Acer rubrum[3,5]	(red maple)
Anacardiaceae – Cashew Family	
Toxicodendron radicans	(poison ivy)
Apiaceae – Celery Family	
Sanicula canadensis	(Canada black snakeroot)
Apocynaceae – Dogbane Family	
Vinca minor[2]	(common periwinkle)
Aquifoliaceae - Holly Family	
Ilex opaca[3]	(American holly)
Araceae – Arum Family	
Arisaema triphyllum[3,5]	(Jack-in-the-pulpit)
Symplocarpus foetidus[3,4]	(skunk cabbage)
Araliaceae – Ginseng Family	
Hedera helix[2]	(English ivy)
Panax trifolius[3,5]	(dwarf ginseng)
Asteraceae – Aster Family	
Ageratina altissima	(white snakeroot)
Bidens frondosa	(beggartick)
Eclipta prostrata[2]	(yerba-de-tajo)
Erechtites hieracifolia	(pilewort)
Eupatorium serotinum	(late-flowering boneset)
Eurybia divaricata[3,5]	(white wood aster)
Solidago canadensis	(Canada goldenrod)
Symphyotrichum dumosum[3,5]	(bushy aster)
Symphyotrichum lateriflorum	(calico aster)
Taraxacum officinale[2]	(dandelion)
Balsaminaceae – Touch-me-not Family	
Impatiens capensis[3,5]	(touch-me-not)
Betulaceae – Birch Family	
Betula nigra[3,5]	(river birch)
Carpinus caroliniana[3,5]	(ironwood)
Brassicaceae – Mustard Family	
Alliaria petiolata[2]	(garlic mustard)
Cardamine sp.	(toothwort, bitter Cress)

Caprifoliaceae - Honeysuckle Family	
Lonicera japonica[2]	(Japanese honeysuckle)
Sambucus canadensis[3,5]	(common elderberry)
Viburnum dentatum var. *dentatum*[3,5]	(southern arrowwood)
Viburnum prunifolium[3,5]	(black haw)
Caryophyllaceae – Pink Family	
Stellaria media[2]	(chickweed)
Celastraceae – Staff-tree Family	
Celastrus orbiculatus[2]	(Oriental bittersweet)
Euonymus americanus[3,5]	(strawberry bush)
Clethraceae – White Alder Family	
Clethra alnifolia	(sweet pepperbush)
Clusiaceae	
Hypericum mutilum	(dwarf Saint John's-wort)
Cornaceae - Dogwood Family	
Cornus alternifolia	(alternate-leaved dogwood)
Cornus florida[3,5]	(American dogwood)
Cornus racemosa	(gray dogwood)
Cupressaceae – Cypress Family	
Juniperus virginiana	(eastern red cedar)
Cuscutaceae – Dodder Family	
Cuscuta gronovii[3,5]	(Gronovius' dodder, love vine)
Cyperaceae – Sedge Family	
Carex lupulina[3]	(hop sedge)
Cyperus retrorsus	(pine barren flatsedge)
Dennstaedtiaceae – Hay-scented Fern Family	
Pteridium aquilinum	(Bracken Fern)
Dryopteridaceae – Wood Fern Family	
Athyrium filix-femina[3]	(lady fern)
Dryopteris sp.	(wood fern)
Onoclea sensibilis[3,5]	(sensitive fern)
Ericaeae - Heath Family	
Gaylussacia sp.	(huckleberry)
Kalmia latifolia[3,5]	(mountain laurel)
Leucothoe racemosa [3,5]	(fetterbush)
Rhododendron sp.[2]	(rhododendron)
Rhododendron viscosum	(swamp azalea)
Vaccinium caesariense	(New Jersey blueberry)
Vaccinium corymbosum	(highbush blueberry)
Vaccinium pallidum	(lowbush blueberry)
Euphorbiaceae – Spurge Family	
Acalypha rhomboidea	(rhombic three-seeded mercury)
Fabaceae – Pea Family	
Apios americana[3,5]	(ground-nut)
Desmodium paniculatum	(panicled tick-trefoil)
Robinia pseudoacacia[3]	(black locust)

Trifolium repens	(white clover)
Wisteria floribunda[2]	(Japanese wisteria)
Fagaceae - Beech Family	
Fagus grandifolia[3,5]	(American beech)
Quercus alba[3,5]	(white oak)
Quercus falcata[3,5]	(spanish oak)
Quercus velutina[3,5]	(black oak)
Quercus phellos[3,5]	(willow oak)
Geraniaceae – Geranium Family	
Geranium maculatum	(wild geranium)
Hamamelidaceae - Witch Hazel Family	
Liquidambar styraciflua[3,5]	(sweet gum)
Iridaceae – Iris Family	
Iris versicolor[3,5]	(northern blue flag)
Juglandaceae - Walnut Family	
Carya glabra[3,5]	(pignut hickory)
Carya ovata	(shagbark hickory)
Carya tomentosa[3,5]	(mockernut hickory)
Juglans nigra	(black walnut)
Juncaceae – Rush Family	
Juncus tenuis	(path rush)
Luzula sp.	(wood-rush)
Lamiaceae – Mint Family	
Lycopus virginicus[3,5]	(Virginia water-horehound)
Scutellaria galericulata	(marsh skullcap)
Lauraceae – Laurel Family	
Lindera benzoin[3,5]	(spicebush)
Sassafras albidum[3,5]	(sassafras)
Lemnaceae – Duckweed Family	
Lemna minor	(duckweed)
Liliaceae – Lily Family	
Erythronium americanum[3,5]	(trout lily)
Maianthemum canadense[3,4]	(Canada mayflower)
Maianthemum racemosum[3,5]	(false Solomon's seal)
Medeola virginiana[3,5]	(Indian cucumber-root)
Polygonatum biflorum[3,5]	(Solomon's seal)
Uvularia perfoliata[3,5]	(perfoliate bellwort)
Uvularia sessilifolia[3]	(sessile-leaf bellwort, wild oats)
Lycopodiaceae – Clubmoss Family	
Lycopodium obscurum[3,5]	(tree clubmoss)
Magnoliaceae – Magnolia Family	
Liriodendron tulipifera[3,5]	(tulip tree, yellow poplar)
Magnolia virginiana[3,5]	(sweet bay)
Monotropaceae – Indian-Pipe Family	
Monotropa uniflora[3]	(Indian-pipe)
Moraceae – Mulberry Family	
Morus alba[2]	(white mulberry)

Nyssaceae – Black Gum Family	
Nyssa sylvatica[3,5]	(blackgum, tupelo)
Oleaceae – Olive Family	
Fraxinus pensylvanica	(green ash)
Onagraceae – Evening Primrose Family	
Circaea lutetiana var. *canadensis*	(enchanter's nightshade)
Ludwigia palustris	(common water purslane)
Ophioglossaceae – Adder's Tongue Family	
Botrychium dissectum[3]	(cut-leaved grape fern)
Orchidaceae – Orchid Family	
Epipactis helleborine[2]	(helleborine)
Tipularia discolor	(cranefly orchid)
Orobanchaceae – Broom-rape Family	
Epifagus virginiana	(beech-drops)
Osmundaceae – Royal Fern Family	
Osmunda cinnamomea[3,5]	(cinnamon fern)
Osmunda regalis[3,5]	(royal fern)
Oxalidaceae – Wood Sorrel Family	
Oxalis stricta[3,5]	(common yellow wood sorrel)
Pinaceae - Pine Family	
Pinus echinata[3,5]	(short-leaf pine)
Pinus rigida[3,5]	(pitch pine)
Pinus virginiana[3,5]	(Virginia pine)
Picea abies[2]	(Norway spruce)
Platanaceae – Plane-tree Family	
Platanus occidentalis[3,5]	(sycamore)
Poaceae – Grass Family	
Cinna arundinacea	(common wood-reed)
Danthonia compressa	(flattened wild oat-grass)
Digitaria sp.	(crabgrass)
Leersia virginica	(white grass)
Microstegium vimineum[2]	(stiltgrass)
Tridens flavus[3,5]	(purpletop)
Polygonaceae	
Persicaria longiseta[2]	(bristled knotweed)
Persicaria punctata[3,5]	(dotted smartweed)
Persicaria virginiana	(jumpseed)
Portulacaceae – Purslane Family	
Claytonia virginica	(spring beauty)
Phytolaccaceae – Pokeweed Family	
Phytolacca americana	(pokeweed)
Pyrolaceae – Wintergreen Family	
Chimaphila maculata[3,5]	(spotted wintergreen)
Ranunculaceae – Buttercup Family	
Anemone quinquefolia[3,5]	(wood anemone)
Ranunculus sp.	(buttercup)
Rosaceae – Rose Family	

Amelanchier canadensis	(service berry, juneberry)
Duchesnea indica[2]	(Indian strawberry)
Prunus serotina[3,5]	(black cherry)
Pyrus sp.[2]	(crabapple)
Rosa multiflora [2]	(multiflora rose)
Rubiaceae	
Galium sp.	(bedstraw)
Galium circaezans[3,5]	(wild licorice)
Mitchella repens	(partridge berry)
Salicaceae – Willow Family	
Salix sp.	(willow)
Saururaceae	
Saururus cernuus[3,5]	(lizard tail)
Simaroubaceae – Quassia Family	
Ailanthus altissima [2]	(tree of heaven)
Smilacaceae – Smilax Family	
Smilax glauca	(glaucous greenbrier)
Smilax rotundifolia	(common greenbrier)
Thelypteridaceae	
Thelypteris noveboracensis	(New York fern)
Ulmaceae – Elm Family	
Ulmus rubra	(slippery elm)
Urticaceae – Nettle Family	
Boehmeria cylindrica[3,5]	(false nettle)
Pilea pumila	(clearweed)
Verbenaceae – Vervain Family	
Verbena urticifolia	(white vervain)
Violaceae	
Viola sp.	(violet)
Vitaceae – Grape Family	
Parthenocissus quinquefolia[3]	(Virginia creeper)
Vitis labrusca[3,5]	(fox grape)
Vitis riparia	(riverbank grape)

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[1] Additional species near Camp Dark Waters are noted in a study by Ted Gordon in a survey of Medford Leas, a retirement community on the opposite side of the stream from Camp Dark Waters.

[2] Introduced/cultivated species.

[3] Species collected by Witmer Stone, listed in Stone (1911) as occurring in Medford, New Jersey.

[4] Herbarium specimen located in Academy of Natural Sciences, Philadelphia, collected by Witmer Stone and labeled "Medford".

[5] Herbarium specimen located in Academy of Natural Sciences, Philadelphia, collected by Witmer

Stone and labeled either "Flora of Catocksin Camp Medford, NJ" or "Vicinity of Catoxen Cabin, 1 mi. n.e. of Medford, NJ".

APPENDIX 2

Witmer Stone was not unusual in having more than one spelling for, "Catocksin" or "Catoxen." Nathaniel R. Ewan (1932) wrote in *Historical Facts About Vincentown* (a town 4.5 miles east of Camp Dark Waters) that the name comes from "the proximity of the nearby Indian settlement of the Quakeson tribe. Several ways of spelling this name are incorporated in various records, Quakson, Quakerson, Quaxon, Quakeson, Coaxon, Cotoxen, etc."

APPENDIX 3

In 1908 George Spencer Morris, designer and builder of "Catoxen Cabin," published an article in *Cassinia,* the Proceedings of the Delaware Valley Ornithological Club, entitled, "Catoxen Cabin on the Rancocas" (Morris, 1908). The editor of *Cassinia* allowed Morris to diverge from strict ornithological information as Morris wrote lyrically about the history of the cabin, "perhaps even staid married men like ourselves might keep a little in touch with the old woods life. . .and there was conceived the plan of erecting a small house, shack, or shanty somewhere in 'God's great out-of-doors.'...We just wanted a bit of woodland—pines preferred—well away from the city; a stream that would float a canoe and perhaps furnish a few fish. . .a country not thickly settled where we could . . . once more enjoy the sweet incense of frying bacon wafting upward from overhanging boughs. . ." (Morris, 1908).

It is clear from the immense amount of work that Witmer Stone put into collecting specimens from "Camp Catoxen" and other parts of southern New Jersey that some owners of the cabin took the camp more seriously than others. But if Morris was allowed to ramble a bit in an ornithological journal, perhaps a botanical journal would allow a bit of similar rambling by the authors of this paper.

In his biography of Witmer Stone, Scott McConnell (2014) noted that, "In 1927, Catoxen and the surrounding area were bought by the Arch Street Friends Meeting (Philadelphia) for use as a camp. Amazingly, the cabin still stands near its original location, as part of Camp Dark Waters, a Quaker youth camp; despite its continuous use by rambunctious boys since the late 1920s, it is still in remarkably good condition." Because the first author of this paper is the son of the former directors of Camp Dark Waters, we can make a slight correction to say that the camp was rented, not bought, by the Arch Street Friends Meeting. Today Camp Dark Waters is a non-profit corporation.

McConnell, however, is quite right about the rambunctious boys. At one point in the late 1950's Wilbert Braxton, director of the camp (and father of the first author of this paper) heard a great deal of noise coming from the oldest boys' cabin on the hill—Witmer Stone's original cabin. It was after dark, and the boys were supposed to be quiet at this time, but the young counselor in charge was having a hard time getting them to settle down for bed. Wilbert Braxton decided to walk up the hill and investigate. Waiting outside of the cabin to hear what was going on, Wilbert heard the young counselor say to the rambunctious boys, "If you don't settle down and be quiet I'll have to get Mr. Braxton up here." Derisive laughter from the boys followed this clearly empty threat. The counselor continued, "I'm not kidding. I can get the director to come up here and then you'll really be in trouble!" Quiet behavior did not ensue. In one last desperate attempt the counselor then went out on a limb and said "OK, Mr. Braxton you can come in now." At that point Wilbert Braxton stepped out of the shadows and into the cabin and calmly said, "What seems to be the problem?" A dead silence fell over the cabin as campers and counselor alike sat in amazement.

Is it due to such powerful Quaker discipline that the cabin is in such good shape? History does not indicate that rambunctious behavior ceased henceforth in the oldest boys' cabin, but at least for the rest of that night the boys were exceedingly well-behaved. The nonviolent power of Quaker discipline reigned!

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An Overview of Scientific Names Honoring the City of Philadelphia, Pennsylvania, with an Emphasis on Flowering Plants

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ABSTRACT. The history of the word "Philadelphia" is reviewed. Using available nomenclatural indices, searches were conducted for scientific names that honor Philadelphia, Pennsylvania. Thirteen species names of flowering plants were identified as being toponyms for Philadelphia, Pennsylvania. The nomenclature and taxonomy of these were reviewed and it was determined that only four, *Erigeron philadelphicus, Lilium philadelphicum, Panicum philadelphicum,* and *Physalis philadelphica*, are currently accepted, the other nine either being synonyms or not validly published and unavailable. One accepted name of an alga (diatom), *Cymbella philadelphica*, is a Philadelphia, Pennsylvania toponym. From a preliminary review of the zoological literature it was determined that twenty names of animals are likely toponyms for Philadelphia, Pennsylvania, with twelve (one bee, two beetles, three birds, one fish, two flies, one spider, one wasp, and one worm) in current use, the other eight (all flies) being synonyms. Numerous names were identified that can be mistakenly identified as honoring Philadelphia, Pennsylvania but actually honor another Philadelphia or refer to the plant genus *Philadelphus* L., which was not named in honor of Philadelphia. In total, thirty-four Philadelphia toponyms have been identified in biological nomenclature, of which seventeen are in current use.

INTRODUCTION

Most Philadelphians know that their hometown is the "city of brotherly love." The choice of this name is generally attributed to William Penn (1644-1718). Reyburn et al. (1908: 47): "As to the naming of Philadelphia, there have been several statements made, but the general belief is that Penn's acquaintance with the Scriptures and the meaning of the word – brotherly love – suggested it to him as the name of his city. According to early reports of the Society of Friends, the name Philadelphia was used by him for the name of the city at the time of his first visit." The name is derived from the Greek words *phileo* (love) and *adelphos* (brotherly or sisterly). Philadelphia is formed like other place names honoring a person or people, the feminine Greek or Latin suffix -ia being added to the name or its stem (e.g., Alexandria, Columbia, Georgia, Pretoria; Gallia, Germania). This formation is consistent with eponymic genus names of plants (McNeill et al. 2012: Rec. 60B.1(b, c)).

As the above quoted passage indicates, the name Philadelphia did not originate with Penn. Many cities prior to the founding of Philadelphia, Pennsylvania, in 1682 had taken the name Philadelphia. Possibly the first city to take the name Philadelphia was in what is now the Aegean region of Turkey. The city was named after King Attalus II of Pergamon (159-138 B.C.) whose nickname was "Philadelphos," a reference to Attalus's loyalty to his brother and predecessor to the throne, King Eumenes II of Pergamon (197-160 B.C.). The city was the site of one of the seven churches of Asia in the Book of Revelation. It is known as Alaşehir today.

Amman (Ammon), Jordan was once known as Philadelphia when Ptolemy II Philadelphus (309–246 B.C.), the Macedonian ruler of Ptolemaic Egypt (reign: 283–246 B.C.), renamed the city Philadelphia upon his occupation of it. Ptolemy II took the name Philadelphus upon marrying Arsinoe II, his sister.

Many other more recent cities, towns or villages also have (or had) the name Philadelphia. Among them include: a village in Germany (named for Philadelphia, Pennsylvania) in Storkow, Bradenburg; a town in Tyne and Wear, U.K. (named during the Revolutionary War to honor the British capture of Philadelphia, Pennsylvania); a town in the City of Cape Town, South Africa; a town (and village) in New York; and cities in Illinois, Indiana, Mississippi, and Tennessee. In other countries, cities or towns have the name Filadelfia, including ones in Brazil (one in Bahia, one in Tocantins), Costa Rica, Italy, and Paraguay. Nea Filadelfeia ("New Philadelphia") is in Greece.

The existence of a person Philadelphus and other cities and towns that go by the name Philadelphia has brought into the literature many scientific plant names that appear to be toponyms for Philadelphia, Pennsylvania but are not. Most notable is the flowering shrub *Philadelphus* L. (Fig. 1). It possibly was named for Ptolemy II Philadelphus (Fernald 1950). Rees (1814: PHI-PHI.), however, had a different opinion: "*Philadelphus* ... the name of a shrub mentioned by Athenaeus, which it is impossible for us to ascertain. Caspar Bauhin [1623: 398] first applied this synonym to our Syringa, or Mock Orange, with which it remains, as the generic appellation. Linnaeus supposes it was designed to commemorate Ptolemy Philadelphus, king of Egypt; but a much more probable opinion seems to be, that the plant of Athenaeus was of the twining or clasping kind, something like *Periploca graeca*; and that the word, by poetical fancy, was intended to express its brotherly love for those near it." (see also Hu 1954: 313). Besides *Philadelphus* itself, there are many other Philadelphia, Pennsylvania toponym "mimics" in the literature that actually refer to the genus *Philadelphus*. These include two flowering plants, *Styrax philadelphoides* Perkins and *Rhynchanthera philadelphensis* Brade, their epithets suggesting a similarity with *Philadelphus*. Dozens of fungi that grow on *Philadelphus* indicate this through their specific epithets, including *Cytospora philadelphi* Pisareva, *Deuterophoma philadelphi* Gucevič, and *Oxyporus philadelphi* (Parmasto) Ryvarden. Likewise, numerous insects that feed off *Philadelphus* indicate this through their specific epithets, including *Aleyrodes philadelphi* Danzig (homopteran whitefly), *Aphis philadelphi* Borner (aphid), *Aphis philadelphicola* Pashchenko (aphid), *Chelostoma philadelphi* (Robertson) (leaf cutting bee), and *Liriomyza philadelphivora* Spencer (leaf miner fly).

There are also at least two toponyms that refer to another Philadelphia. The amaryllid *Habranthusphiladelphicus* Ravenna (in *Onira* 9: 16. 2003) is a toponym for Filadelfia, Paraguay (the capital of the Department of Boquerón), a community founded in the 1930s by Mennonites who emigrated from the former Soviet Union. *Arambourgiania philadelphiae* (Arambourg) (≡*Titanopteryx philadelphiae* Arambourg) is the name for a late Cretaceous pterosaur, the bone of which was collected in Amman, Jordan. The specific epithet *philadelphiae* is a reference to the name of this region in ancient times.

Phyladelphia occasionally was used as a spelling variant for Philadelphia, Pennsylvania. The Phyladelphia (epithets: *phyladelphica*, *phyladelphicum*, *phyladelphicus*) spelling is chiefly limited to early French publications. However, John Adams (1722-1801; president, 1797-1801) also used this spelling. For example, in a letter (9 Oct. 1774) to his wife Abigail Adams

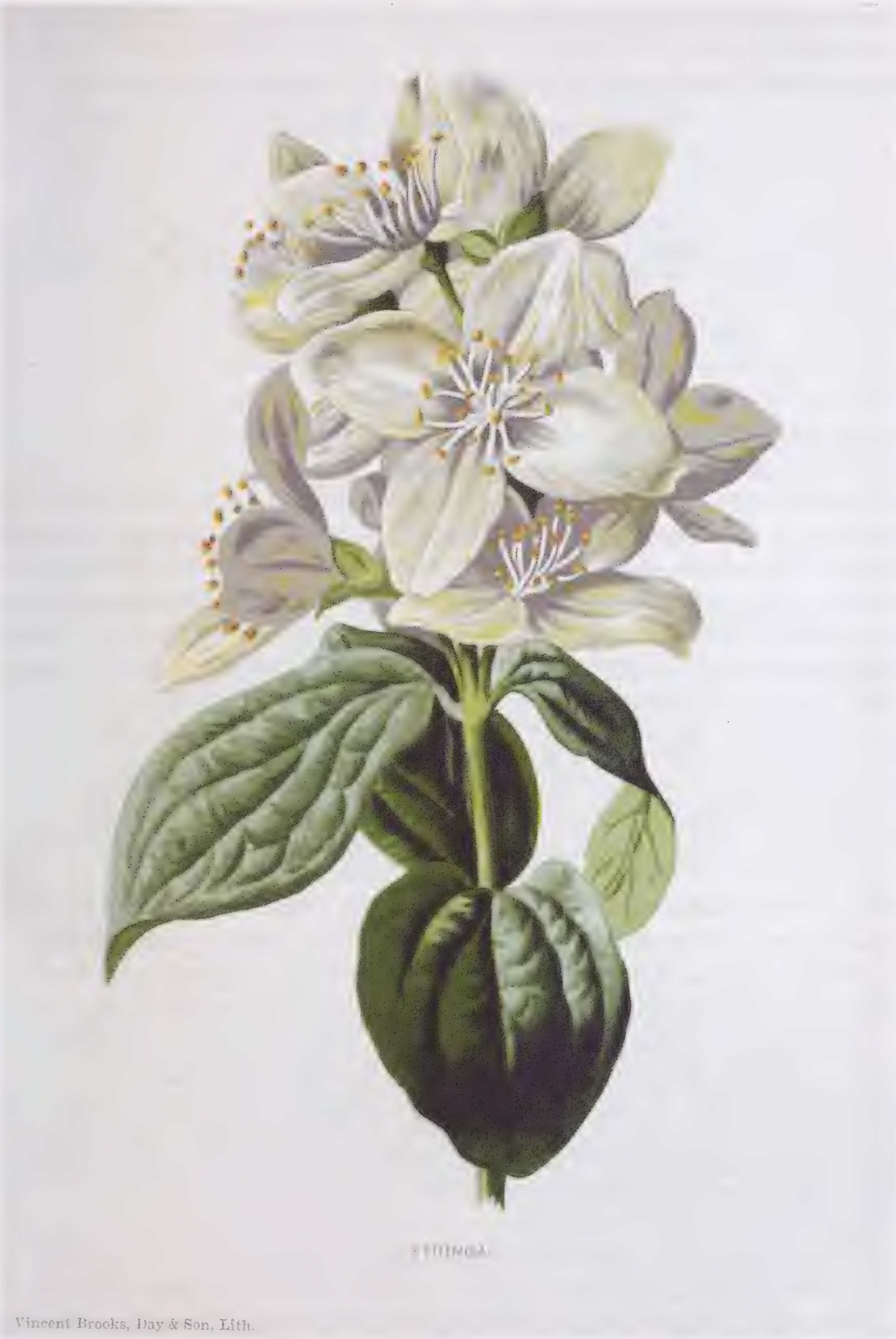
SYRINGA.
Vincent Brooks, Day & Son, Lith.

Figure 1. *Philadelphus coronarius* L., the type of *Philadelphus* L. Original image from McDonald. 1895: t. 16. Copy of image obtained from www.plantillustrations.org. The name syringa, used in McDonald's caption, is problematic. *Syringa* L. (Oleaceae) is a genus name applied to a group of plants frequently cultivated and commonly known as lilacs. However, the common name syringa is sometimes applied to species of *Philadelphus*, especially *P. coronarius*. In pre-Linnaean literature (i.e., pre Linnaeus 1753), the genus name *Syringa* was variously applied to species now placed in *Syringa* (e.g., Bauhin 1623: 398; Royen 1740: 397) or *Philadelphus* (e.g., Bauhin 1623: 398; Boerhaave 1720: 238).

he wrote [original spelling and capitalization is retained]: "Phyladelphia with all its Trade, and Wealth, and Regularity is not Boston. The Morals of our People are much better, their Manners are more polite, and agreable — they are purer English. Our Language is better, our Persons are handsomer, our Spirit is greater, our Laws are wiser, our Religion is superiour, our Education is better. We exceed them in every Thing, but in a Markett, and in charitable public foundations" (see C.F. Adams 1876). Examples of the Phyladelphia spelling in scientific names include: *Calycanthus phyladelphicus* (Noisette in Steudel 1840: 262), *Erigeron phyladelphicum* (Mouroux 1773: 70), *Lilum phyladelphicum* (Noisette 1826: 88; Salm-Reifferscheidt 1834: 147), and *Physalis phyladelphica* (Dumont de Courset 1811: 156).[1]

TOPONYMS

The following electronic indices were used to identify Philadelphia, Pennsylvania toponyms and potential toponyms: AlgaeBase (Guiry and Guiry 2015), Index Fungorum, Integrated Taxonomic Information System (ITIS), International Plant Names Index, Mycobank (Wiele and Stalpers 2015), and Tropicos. The current accepted names are given in bold font. Homotypic synonyms are indicated with the identity sign (≡), heterotypic synonyms by the equals sign (=). Authorship of algae, fungi and plant names and animal names follow the *International Code of Nomenclature for Algae, Fungi and Plants* (McNeill et al. 2012) and *International Code of Zoological Nomenclature* (International Commission on Zoological Nomenclature 1999), respectively, the main difference being that authorship of botanical names includes transfer authors when the name used is different in rank or combination from the basionym (McNeill et al. 2012: Art. 49.1), whereas authorship of zoological names is unaffected by changes in rank or combination (I.C.Z.N. 1999: Art. 50.3)

Flowering Plants

The Philadelphia toponyms are given chronologically beginning with the Linnaean toponyms. In all the three cases in which Linnaeus used a toponymic epithet honoring Philadelphia he likely did so because in the genus he had already used a toponym honoring Canada or Pennsylvania (see Tables 1, 2). Linnaeus's Canada does not correspond to today's country by that name. Stearn (1957: 144) reported Linnaeus's Canada as "a region of north-eastern America, partly in Canada, mostly in the United States where Kalm did much collecting, i.e. roughly from Philadelphia and New York northward, by way of Albany, to Montreal and Quebec and from Albany westward along the Mohawk River to Lake Ontario and Niagara Falls (cf. Rydberg, 1907)."

01. ***Erigeron philadelphicus*** L., Sp. Pl. 2: 863. 1753 ("*philadelphicum*") ≡ *Stenactis philadelphica* (L.) Hegi, Ill. Fl. Mitt.-Eur. 6(1.10): 447. 1917 ≡ *Tessenia philadelphica* (L.) Lunell in Amer. Midl. Naturalist 5: 59. 1917 – Lectotype (designated by Scott in Bosser et

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[1] Of course there was also variation in the spelling of Pennsylvania, leading to the following twelve (!) orthographic variants finding use as epithets in botany: *pensylvanica* (*pensylvanicum, pensylvanicus*), *pennsylvanica* (*pennsylvanicum, pennsylvanicus*), *pensilvanica* (*pensilvanicum, pensilvanicus*), *pennsilvanica* (*pennsilvanicum, pennsilvanicus*). Stearn (1957: 145 fn. 1): "The epithet *pensylvanicus* used by Linnaeus and his son, Lamarck, Loiseleur, Michaux, Miller, and Wallroth ... accords with 17th and 18th century usage and is not an orthographic error for *pennsylvanicus*; the founder of the state of Pennsylvania described himself on the bookplate (reproduced in R.M.M. Hunt, *William Penn, Horticulturist*; 1953) as 'William Penn Esq., Proprietor of Pensylvania.'"

Table 1. The forty-six Linnaean toponyms for Canada.

Allium canadense L. – Sp. Pl. 2: 1195. 1753 [1 May 1753]
Anemone canadensis L. – Syst. Nat., ed. 12. 3: 231. 1768
Antirrhinum canadense L. – Sp. Pl. 2: 618. 1753
Aquilegia canadensis L. – Sp. Pl. 1: 533 (-534). 1753
Arabis canadensis L. – Sp. Pl. 2: 665. 1753
Asarum canadense L. – Sp. Pl. 1: 442. 1753
Astragalus canadensis L. – Sp. Pl. 2: 757. 1753
Buchnera canadensis L. – Mant. Pl.: 88. 1767
Cercis canadensis L. – Sp. Pl. 2: 753. 1753
Cineraria canadensis L. – Sp. Pl., ed. 2. 2: 1244. 1763
Cistus canadensis L. – Sp. Pl. 1: 526. 1753
Collinsonia canadensis L. – Sp. Pl. 1: 28. 1753
Cornus canadensis L. – Sp. Pl. 1: 118. 1753
Elymus canadensis L. – Sp. Pl. 1: 83. 1753
Erigeron canadensis L. – Sp. Pl. 2: 863. 1753
Ferula canadensis L. – Sp. Pl. 1: 247. 1753
Hedysarum canadense L. – Sp. Pl. 2: 748. 1753
Hippophaë canadensis L. – Sp. Pl. 2: 1024. 1753
Hydrastis canadensis L. – Syst. Nat., ed. 10. 2: 1088. 1759
Hydrophyllum canadense L. – Syst. Nat., ed. 10. 2: 919. 1759
Hypericum canadense L. – Sp. Pl. 2: 785. 1753
Lactuca canadensis L. – Syst. Nat., ed. 10. 2: 1193. 1759
Lilium canadense L. – Sp. Pl. 1: 303. 1753
Menispermum canadense L. – Sp. Pl. 1: 340. 1753
Mentha canadensis L. Sp. Pl. 2: 577. 1753
Mespilus canadensis L. – Sp. Pl. 1: 478. 1753
Ornithogalum canadense L. – Sp. Pl. 1: 308. 1753
Pedicularis canadensis L. – Mant. Pl.: 86. 1767
Pinus canadensis L. – Sp. Pl., ed. 2. 2: 1421. 1763
Polymnia canadensis L. – Sp. Pl. 2: 926. 1753
Potentilla canadensis L. – Sp. Pl. 1: 498. 1753
Prunus canadensis L. – Sp. Pl., ed. 2. 1: 678. 1762
Queria canadensis L. – Sp. Pl. 2: 90. 1753
Rhodora canadensis L. – Sp. Pl., ed. 2. 1: 561. 1762
Rubus canadensis L. – Sp. Pl. 1: 494. 1753
Sambucus canadensis L. – Sp. Pl. 1: 269. 1753
Sanguinaria canadensis L. – Sp. Pl. 1: 505. 1753
Sanguisorba canadensis L. – Sp. Pl. 1: 117. 1753

Sanicula canadensis L. – Sp. Pl. 1: 235. 1753
Senecio canadensis L. – Sp. Pl. 2: 869. 1753
Sison canadense L. – Sp. Pl. 1: 252. 1753
Solidago canadensis L. – Sp. Pl. 2: 878. 1753
Sonchus canadensis L. – Sp. Pl. 2: 793. 1753
Teucrium canadense L. – Sp. Pl. 2: 564. 1753
Urtica canadensis L. – Sp. Pl. 2: 985. 1753
Viola canadensis L. – Sp. Pl. 2: 936. 1753

Table 2. The seven Linnaean toponyms for Pennsylvania

Acer pensylvanicum L. – Sp. Pl. 2: 1055. 1753
Anemone pensylvanica L. – Mant. Pl. Altera: 247. 1771
Avena pensylvanica L. – Sp. Pl. 1: 79. 1753
Physalis pensylvanica L. – Sp. Pl., ed. 2. 2: 1670. 1763
Polygonum pensylvanicum L. – Sp. Pl. 1: 362. 1753
Potentilla pensylvanica L. – Mant. Pl.: 76. 1767
Saxifraga pensylvanica L. – Sp. Pl. 1: 399. 1753

al. Fl. Mascareignes 109: 106 1993): collector unknown, Herb. Linn. No. 994.1 (LINN). – Image of lectotype available at http://linnean-online.org/10092/.

Erigeron philadelphicus is the fifth of twelve species of *Erigeron* described by Linnaeus in *Species Plantarum* (1753). The epithet was originally spelled "*philadelphicum*," Linnaeus and other early authors treating *Erigeron* (Greek *eri,* early, and *geron,* old man) as neuter. However, Linnaeus's original neuter gender requires re-assignment to masculine, the classical gender (McNeill et al. 2012: Art. 62.1 Note 1). Linnaeus reported "Habitat in Canada" and attributed this to Pehr Kalm. Linnaeus's third species was named *Erigeron canadensis* (epithet originally spelled "*canadense*").

Erigeron philadelphicus (Fig. 2) is the most common flowering plant species named for Philadelphia, being present throughout most of North America and introduced and escaped from cultivation in Asia and Europe (Halliday 1976: 117; Nesom 2006: 320). The species is quite weedy and has spread considerably in recent times making it difficult to ascertain its original native range in North America. Barton (1825: 229) reported, "It grows in the greatest profusion in all the fields near Philadelphia ... ." However, Barton's illustration of his *E. philadelphicum* (tab. 20; figs. 1, 2 in Barton; reproduced here as Fig. 3), appears to represent another species, one with white rays (e.g., *E. annuus* (L.) Pers., *E. strigosus* Muhl.), and not *E. philadelphicus* proper as represented in the lectotype, the original description ("radio albo aut purpurascente"), and current usage. Early floras of the area (Britton 1889; Keller and Brown 1905; Taylor 1915) appear to have properly applied the name. Its presence on the Coastal Plain in the Philadelphia area may be due to recent spread, the species reported only from northern New Jersey by Britton (1889), not included in Stone (1911) and cited as "Local in nearly all parts of our range, except the coastal plain in N.J. and on S.I.; apparently there wanting" by Taylor (1915). Tatnall (1946: 265) reported it as "Frequent in moist fields and on moist banks of the Piedmont; rare on the Coastal Plain."

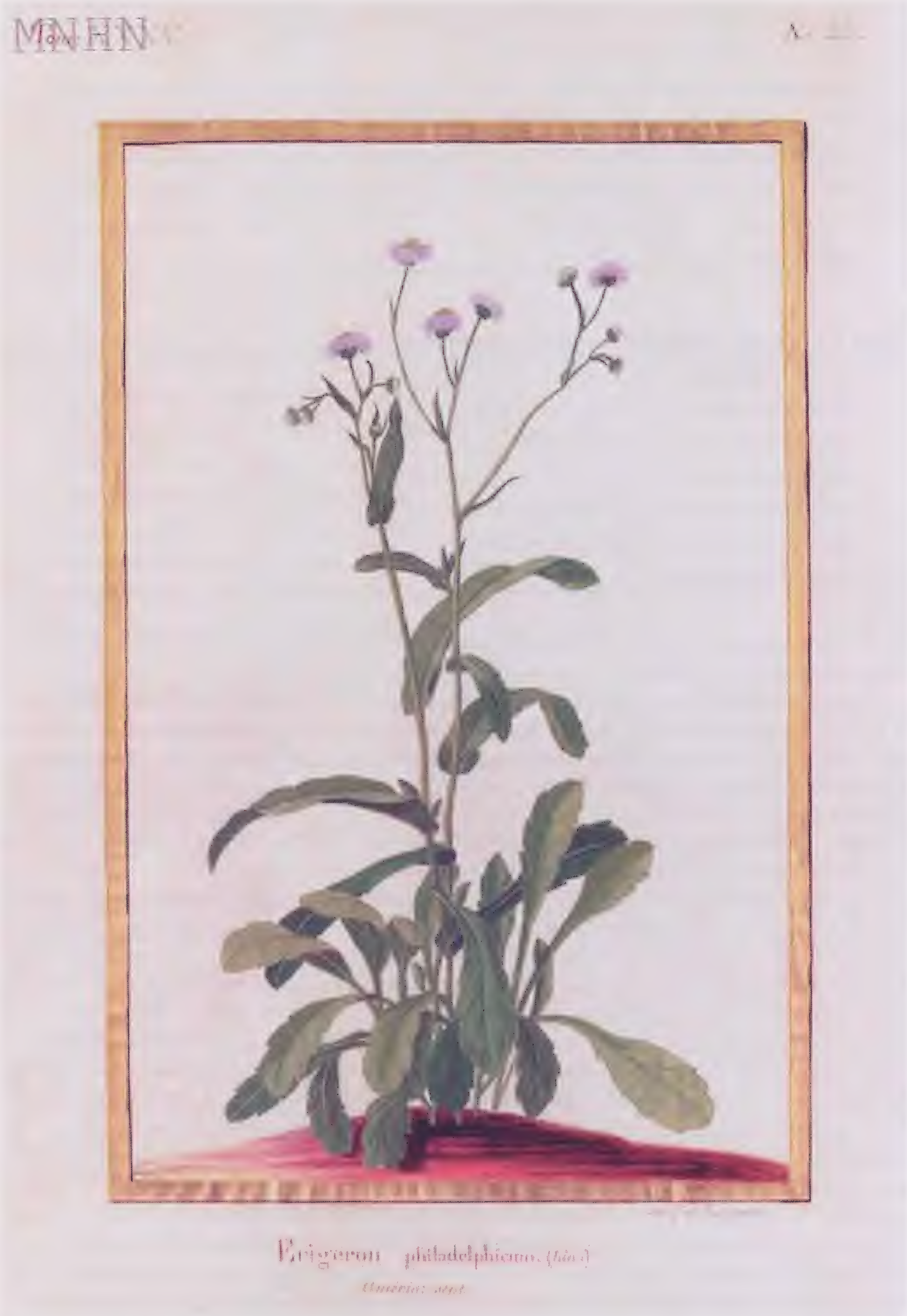

Figure 2. *Erigeron philadelphicus* L. Collection des vélins du Muséum national d'histoire naturelle, vol. 35: t. 28. Illustrator: M.F. Basseporte (1701-1780). Copy of image obtained from www.plantillustrations.org.

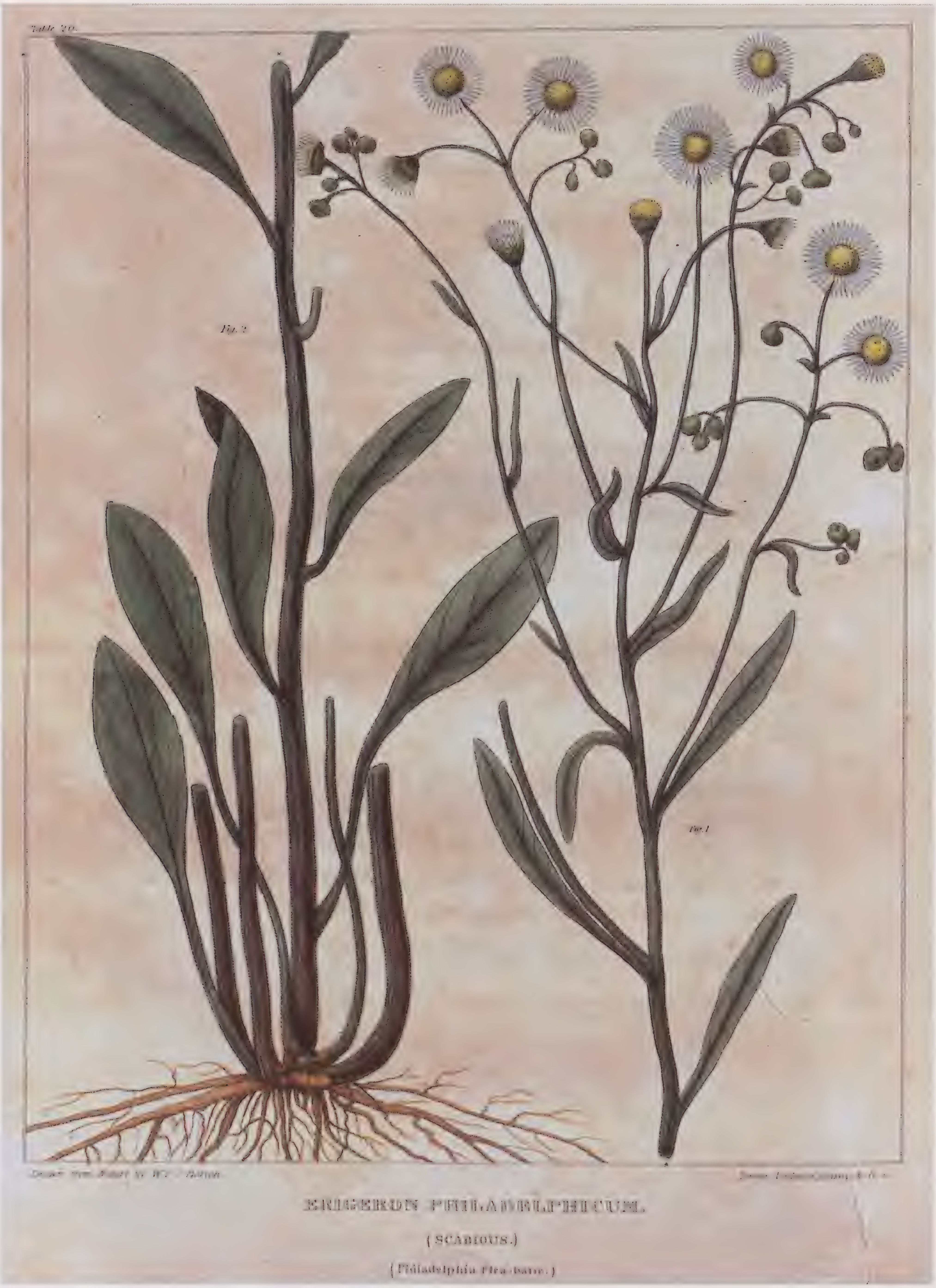
Table 20.
Fig. 2
Fig. 1
ERIGERON PHILADELPHICUM.
(SCABIOUS.)
(Philadelphia Flea-bane.)

Figure 3. *Erigeron philadelphicus* L. Barton. 1825: Tab. 20, figs. 1, 2. Species in the figures is not *Erigeron philadelphicus*. Copy of image obtained from www.plantillustrations.org.

02. *Elymus philadelphicus* L., Cent. Pl. 1: 6. 1755 ≡ *Elymus canadensis* var. *philadelphicus* Farw. in Rep. (Annual) Michigan Acad. Sci. 21: 357. 1920 ≡ (by lectotypification) ***Elymus canadensis*** L., Sp. Pl. 1: 83. 1753 – Lectotype (designated for *E. canadensis* and *E. philadelphicus* by Hitchcock in Contr. U. S. Natl. Herb. 12: 124. 1908): collector not known, Herb. Linn. No. 100.3 (LINN; isotype: US, fragment). – Image of lectotype available at http://linnean-online.org/1630/.

Linnaeus first described *Elymus canadensis* in *Species Plantarum* (1: 83–84. 1753), with the following nomen specificum legitimum: "Elymus spica flaccido-pendula, spiculis inferioribus ternatis; superioribus binatis. *Gen. Nov.* 1094." The following polynomial was also cited: "Gramen secalinum majus altissimum virginianum" followed by "*Moris. hist.* 3 *p. 180. s. 8. t. 10 f. 2*" and "*Raj. supp. 599.*" these being references to volume 3 of Morison's *Plantarum Historia Universalis* (1699) and Ray's (1704) *Historia Plantarum Tomus Tertius qui est Supplementum* where the polynomial appeared. Linnaeus also noted "*Habitat* in Canada. *Kalm.*" The Jupiter or tin sign (♃) was given meaning that Linnaeus took the species to be a perennial. Linnaeus also provided the following detailed statement in which he distinguished *E. canadensis* from *E. Sibiricus* L, which was described immediately before *E. canadensis*:

> "*Convenit in plurimis cum* E. Sibirico, *a quo tamen differt.* 1. *Spiculis villosis, nec nudis.* 2. involucris *in aristam exeuntibus longioribus ipsa spicula, demtis aristis; at in sibirica involucrum minus subulatum, sed fere lanceolatum in aristam desinens, quae longe brevior sua spicula.* 3. Spicae *inferne ternae, quum Sibirica semper duas obtineat.* 4. Spiculae, *dum florent, dehiscunt a scapo patulo, in sibirica vero spiculae approximatae sunt scapo. Variat haec spicis incurvis & pendulis. Aristae corollinae cum maturescit fructus patentireflexae sunt contra ac in Sibirica.*"

Later Linnaeus in his *Centuria I Plantarum* (1755: 6; republished in Amoen. Acad. 4: 266. 1759) described *Elymus philadelphicus* with the following nomen specificum legitimum: ELYMUS (*philadelphicus*) spica pendula; spiculis sexfloris: inferioribus ternatis, superioribus binatis." As with *E. canadensis,* Linnaeus noted "*Habitat* in Pensylvanica. *Kalm.*" and the Jupiter or tin sign (♃) was given to indicate the plant's perennial habit. Linnaeus again provided a detailed statement, this one distinguishing *E. philadelphicus* from *E. canadensis*:

> "*Descr.* Habitus & tota structura simillima canadensi, sed *Spica* in hac omnino apice nutat ultra basin; at in illa spica parum obliqua persistit, *Spiculae* in hac sexflorae, in illa quadriflorae, sed inprimis spiculae, & praecipue intermedia, in hac latus planum uti triticum culmo obvertit, in illa & reliquis latus angulatum scapo obvertit. Haec aristas minus rectas, & parum flexuosas, etjam dum floret, illa vero rectas habet; haec spicas magis villosas, quam illa gerit."

It is quite clear from all of this that when Linnaeus originally described *Elymus canadensis* in 1753 two elements were included that he would later take as two species, *E. canadensis* s.s. and *E. philadelphicus.* Based on Linnaeus's 1755 publication, *E. canadensis* s.s. had

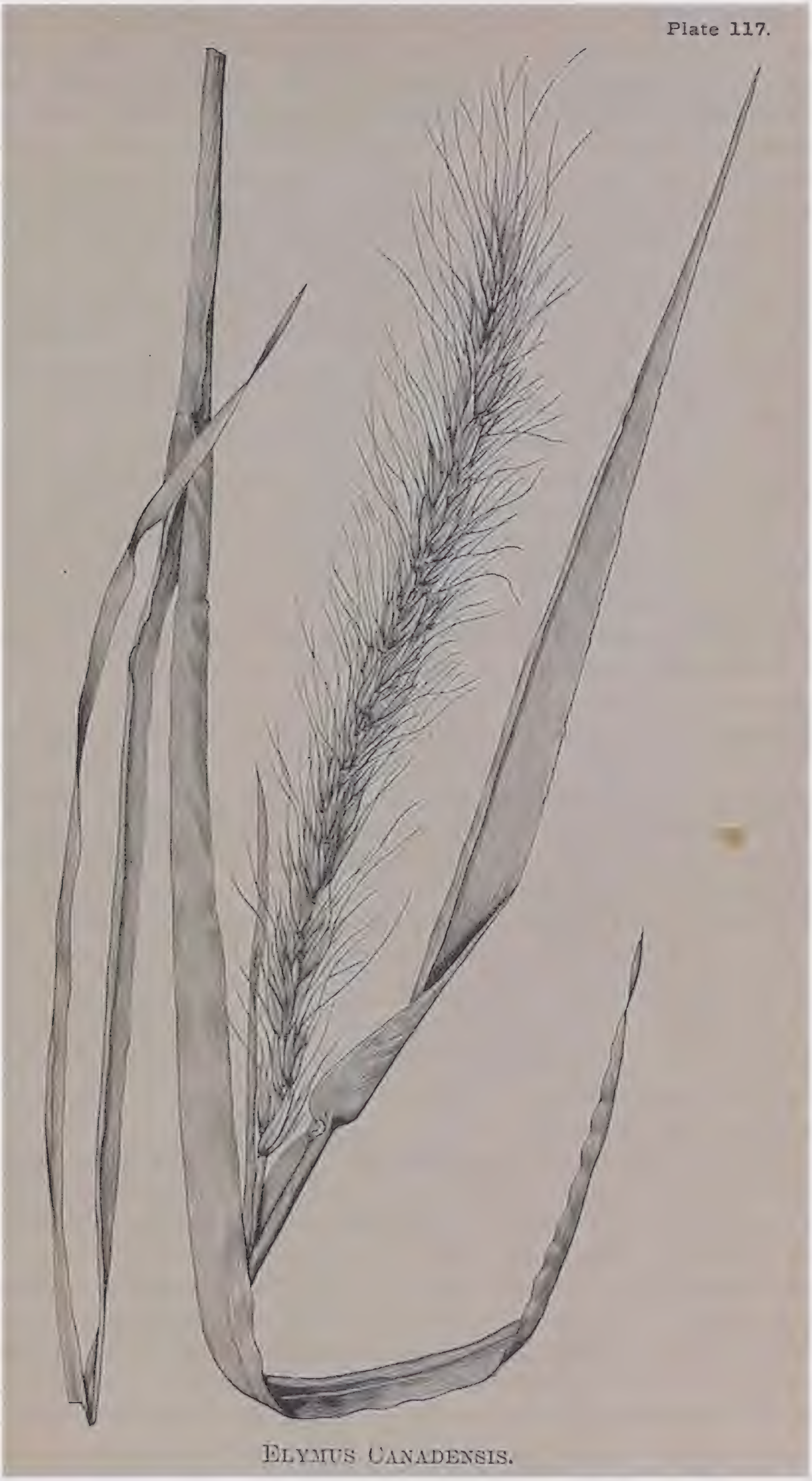
Plate 117.
ELYMUS CANADENSIS.

Figure 4. *Elymus canadensis* L. Vasey and Richardson. 1884: Pl. 117. Copy of image obtained from www.plantillustrations.org.

an erect or slightly nodding inflorescence and spikelets with the angled side turned away from the culm, the spikelets chiefly 4-flowered, glabrous or slightly villous, with straight nonflexuous awns; *E. philadelphicus* had a pendent inflorescence and spikelets with the flat side turned away from the culm, the spikelets chiefly 6-flowered, villous, with nonstraight flexuous awns.

The illustration (sect. 8 tab. 2, fig. 10 of species beginning on page 179; miscited by Linnaeus as "*s. 8. t. 10f. 2*") Linnaeus (1753) cited from Morison (1699) of *Gramen secalinum majus altissimum virginianum* (cited as *Gramen secalinum virginianum maximum* in the illustration) is original material for *Elymus canadensis* and it represents the material with an erect inflorescence (i.e., *E. canadensis* s.s.; sensu L. 1755: 6). In the Linnaean Herbarium (LINN), there are two specimens, 100.3 and 100.4 for *E. canadensis,* 100.3 representing the material with pendent inflorescences (i.e., *E. philadelphicus*) and 100.4 representing the material with an erect inflorescence (i.e., *E. canadensis* s.s. sensu L. 1755). The number 100 represents the genus number for *Elymus* in *Species Plantarum.*

On 100.3 in Linnaeus's hand is "philadelphicus ~~3~~" at the bottom of the sheet and "H.U. canadensis" (H.U.= Hortus Upsaliensis) is written on a piece of mounting tape. The annotations in Linnaeus's hand make clear that 100.3 was examined by Linnaeus and thus original material for the names *Elymus canandensis* and *E. philadelphicus.*

On 100.4 (image available at http: //linnean-online.org/1631/), "canadensis ex Herb. Banksiana" is written in the hand of Sir James Edward Smith (1759-1828), who was the purchaser of Linnaeus's collections (Jarvis 2007: 228-229). Jarvis (2007: 191) reported that the small number of specimens from Joseph Banks' (1743-1820) herbarium were not examined by Linnaeus, since they were added after Linnaeus's death and after the collection reached London. Indeed, there is nothing written in Linnaeus's hand on 100.4. Linnaeus's nomen specificum legitimum is transcribed along with "Elymus canadensis Spec. 3. p. 83" and "ex seminibus canadensis in hortulo meo prognatas 1753" in the hand of Johan Leche, a professor at the Royal Academy of Åbo (Turku; later the University of Helsinki) whom the genus *Lechea* L. honors. Thus, unlike 100.3, 100.4 was likely not examined by Linnaeus.

In the Stockholm Linnean herbarium (S-LINN) there are also two specimens representing the two forms, except that the material with a nodding inflorescence was annotated by Solander as "*philadelphicus*" and the material with the erect inflorescence was annotated as "3" by Linnaeus (i.e., *E. canadensis* in Linnaeus, 1753: 83) and "3 *canadensis*" by Linnaeus filius (see Hitchcock, 1908: 123-124). Solander may have misidentified the sheet he annotated not realizing that Linnaeus and his son likely annotated the other specimen using the original broad circumscription used by Linnaeus in 1753.

Despite the clear distinction Linnaeus made in 1755 between *Elymus canadensis* s.s. and *E. philadelphicus*, both names were prevented from being used when Hitchcock (1908: 124) made them homotypic synonyms (only the earlier *E. canadensis* available for use) by choosing LINN 100.3 (the material later referred to as *E. philadelphicus* and annotated by Linnaeus as such) to serve as the lectotype of both *E. canadensis* and *E. philadelphicus.* Hitchcock was able to do this because the original description of *E. canadensis* by Linnaeus in 1753 included both elements (i.e., *E. canadensis* s.s., *E. philadelphicus*) in its circumscription. Hitchcock in commenting on 100.3 at LINN: "I suspect the history of the specimen is about as follows: Both forms were growing in the Hortus Upsaliensis. Linnaeus described *E. canadensis* from the nodding form and marked the specimen in his herbarium '3'. Later he distinguished between the two forms in his garden and decided to call the erect form *canadensis.* So he crossed out the '3' on his specimen and wrote '*philadelphicus*' but did not mark a specimen '*canadensis.*'"

Some may wonder why Hitchcock did not honor Linnaeus's revised taxonomy of 1755 by lectotypifying only *Elymus philadelphicus* with sheet 100.3 and choosing another element representing the material with erect inflorescences to serve as the type of *E. canadensis.* However, the specimen representing the material with erect inflorescences at LINN was not examined by Linnaeus and the specimen at S-LINN representing the material with erect inflorescences was not annotated by Linnaeus as *E. canadensis,* thus it not being clear that it was examined by Linnaeus (and thus original material for *E. canadensis*). This only leaves Morison's (1699: sect. 8 tab. 2, fig. 10) small illustration, which is not ideal to serve as the lectotype for *E. canadensis.* Furthermore, even though Linnaeus, based on his writings in *Centuria I Plantarum* (1755: 6), clearly included the elements with nodding and erect inflorescences in his original circumscription of *E. canadensis*, his original description (e.g., spica flaccido-pendula) is clearly closer to the element he would later name *E. philadelphicus.* By choosing sheet 100.3 to serve as the lectotype of *E. canadensis* (and *E. philadelphicus*), Hitchcock, one of the founders of the modern type method in plant nomenclature (see Hitchcock 1905), was simply following the standard practice of the time that when faced with heterogeneous elements, the element that best matches the original description should be chosen as the lectotype. This practice is also required in the current botanical code of nomenclature (McNeill et al. 2012: Art. 9.19), which requires a lectotype not be "in serious conflict with the protologue" when another element is available. Likewise (McNeill et al. 2012: Rec. 9A.4) it suggests "if another author has already segregated one or more elements as other taxa" – like Linnaeus did in 1755 by recognizing *E. canadensis* and *E. philadelphicus* – "one of the remaining elements should be designated as the lectotype *provided this element is not in conflict with the original description or diagnosis.*" [emphasis mine]. Therefore, Linnaeus's failure in 1755 to apply the name *E. canadensis* in its revised restricted sense to the material with nodding inflorescences, an application more in line with his original description in 1753, and apply the name *E. philadelphicus* to the material with erect inflorescences and the adoption of the modern type method prevented Linnaeus's revised treatment of 1755 from being adopted.

Elymus philadelphicus is not an illegitimate name (as stated in Jarvis 2007: 494) as Linnaeus did not publish the name as a replacement name for *E. canadensis,* since he did not include all of the original material of *E. canadensis,* such as Morison's (1699: sect. 8 tab. 2, fig. 10) illustration, in the circumscription of *E. philadelphicus* as required by the botanical code of nomenclature (McNeill et al. 2012: Art. 52.2). Under current taxonomy (e.g., Soreng et al. 2003: 284–285; Barkworth et al. 2007: 304, see illustrations), Linnaeus's *E. philadelphicus* =*E. canadensis* var. *canadensis* and his *E. canadensis* s.s. sensu 1755 = *E. canadensis* var. *robustus* (Scribn. & J.G. Sm.) Mack. & Bush (≡ *E. robustus* Scribn. & J.G. Sm.).

03. ***Lilium philadelphicum*** L., Sp. Pl., ed. 2. 1: 435. 1762 – Lectotype (designated by Reveal in Jarvis, *Order Out of Chaos*: 632. 2007): *Kalm s.n.* Herb. Linn. No. 420.7 (LINN). – Image of lectotype available at http: //linnean-online.org/3810/.

Besides his nomen specificum legitimum ("foliis verticillatis, floribus erectis, corolla campanulata, petalis unguiculatis"), Linnaeus (1762: 435) recognized a second unnamed variety (β) with shorter leaves and narrower petal claws based on the description ("Lilium foliis verticillatis brevibus, corollis campanulatis, unguibus petalorum angustioribus, floribus erectis") in Miller (1760: tab. 165, fig. 1). Linnaeus gives the habitat as being in Canada.

Unlike *Erigeron philadelphicus* and *Elymus philadelphicus,* there have been no problems with the application of the name *Lilium philadelphicum* since Linnaeus's original description, and this name remains in use today for this distinctive true lily. The species is the most wide-ranging lily species in North America, being most common in the mountain west and the Great Plains (Skinner 2002: 180). It has declined considerably in the Northeast due to the decline of open habitats and increase of white-tailed deer (Skinner 2002: 180). In the Philadelphia area, the species is tracked as extirpated in Delaware (McAvoy 2013: [8]) and imperiled in New Jersey (Snyder 2013: 7). The species is not tracked as rare in Pennsylvania (Pennsylvania Natural Heritage Program 2015); Rhoads and Block (2007: 152) described the species as "occasional."

Miller (1760: 110), the only reference Linnaeus provided in his protologue for *Lilium philadelphicum*, stated "The Root of this Flower was sent [to] me by Mr. *John Bartram* from *Philadelphia*, who found the Plant growing naturally in that Country." Howard and Staples (1983: 515) indicated the plate from Miller (1760: table 165, fig. 1; reproduced here as Fig. 5) as "presumably" the type. However, this statement cannot be taken as a lectotypification and Herb. Linn. No. 420.7 is to be taken as the lectotype (Jarvis 2007: 632). The following statement from Stone (1911: 345) is a good example of one not realizing that Philadelphia was included in Linnaeus's Canada: "Linnaeus gives Canada as type locality, but this is obviously a lapsus calami, as his only reference is to Miller whose specimen came from John Bartram, Philadelphia."

04. ***Physalis philadelphica*** Lam., Encycl. 2: 101. 1786 ≡ *Physalis angulata* L. var. *philadelphica* (Lam.) A.Gray, Manual, ed. 2: 340. 1856 – Type: "Cultivé en 1784 au Jardin du Roi;" (P-LAM).

= *Physalis ixocarpa* Brot. ex Hornem. in Hort. Bot. Hafn. Suppl.: 26. 1819.

= *Physalis aequata* J.Jacq. ex Nees in Linnaea 6: 470. 1831.

= *Physalis laevigata* M.Martens & Galeotti in Bull. Acad. Brux. xii. I: 131. 1845.

In Lamarck's (1786: 101) protologue for his "Coqueret de Philadelphie," he provided a description (Physalis ramosissima glabra, foliis ovatis repando-dentatis, pedunculis petiolis multo brevioribus") and also cited Miller's (1760) previous polynomial ("Physalis caule herbaceo ramoso, foliis ovato-lanceolatis argute dentatis") and illustration (tab. 206, fig. 1; reproduced here as Fig. 6). Lamarck also had a lengthy paragraph in French where he distinguished this species from other species of *Physalis*, especially *P. pensylvanica* L., on the basis of its pendant large yellow flowers with dark spots in the center with peduncles shorter than the petioles. Lamarck also noted that the species was cultivated at Jardin du Roi and believed the species to be native to North America ("nous le croyons originaire de l'Amerique septentrionale").

Early botanists struggled with the proper application of the name *Physalis philadelphica.* The difficulties were no doubt due to the difficulty of accessing the type material in Paris, as well as the assumption that a species named for Philadelphia would be native to this region. Rydberg (1896: 307, 308), in the introduction of his treatment of North American *Physalis*, stated the following:

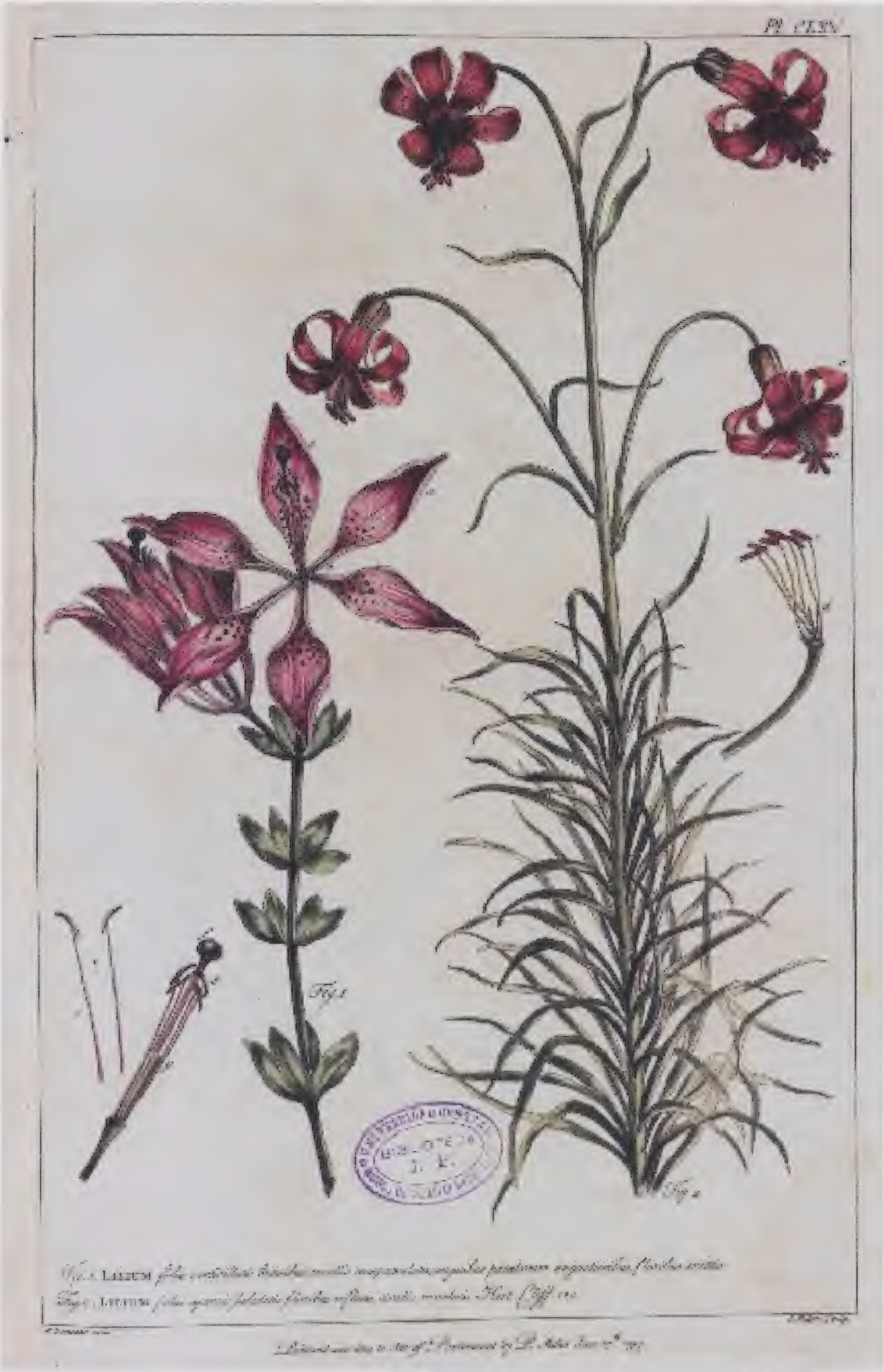

Figure 5. *Lilium philadelphicum* L. Miller. 1760: Pl. CLXV, fig. 1 only. Copy of image obtained from Biblioteca Digital.

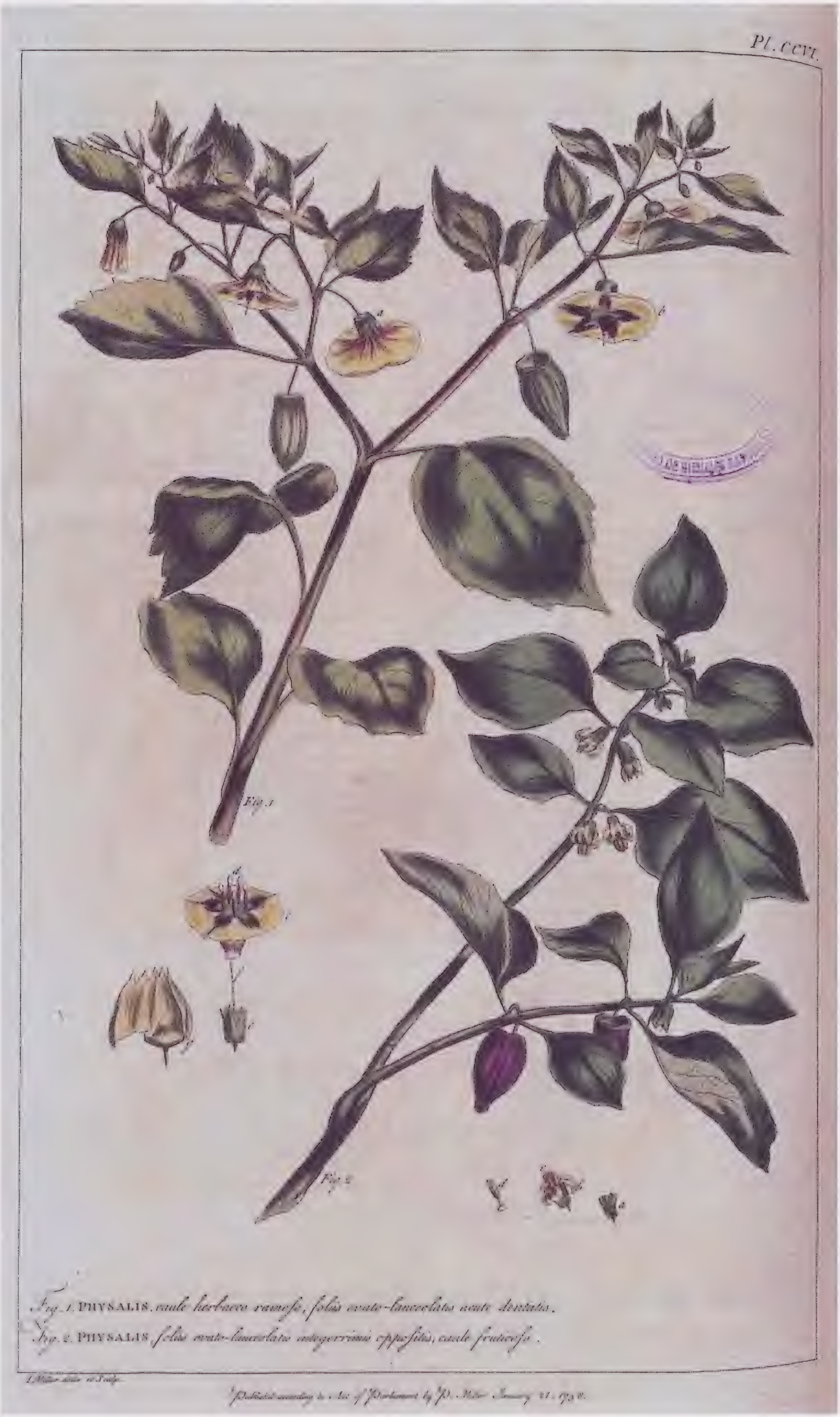
Pl. CCVI.
Fig. 1
Fig. 2
Fig. 1. PHYSALIS, caule herbaceo ramoſo, foliis ovato-lanceolatis acute dentatis.
Fig. 2. PHYSALIS foliis ovato-lanceolatis integerrimis oppoſitis, caule fruticoſo.
J. Miller delin. et Sculp.
Published according to Act of Parliament by P. Miller January 21. 1758.

Figure 6. *Physalis philadelphica* Lam. Miller. 1760: Pl. CCVI, fig. 1 only. Copy of image obtained from Biblioteca Digital.

> "*Physalis Philadelphica* is not very well understood. ... As I understand *P. Philadelphica* Lam., it is a species nearly related to *P. longifolia* Nutt. [a species native to the eastern U.S.], but with broader leaves. It is as often perennial as annual (the original description says annual), but is the only species of the eastern United States that fits the description of *P. Philadelphica* at all, except *P. aequata* Jacq., which, however, is not a native but recently introduced. ... One thing that has caused much confusion, is that *P. Philadelphica* is generally described as the only species in which the berry fills and even bursts the calyx, a character that is far from constant, and also found in *P. longifolia* Nutt., and still more common in *P. aequata* Jacq."

In the treatment Rydberg (1896: 336–338) recognized *P. philadelphica* as a species native to the U.S. (ranging from "Rhode Island and Georgia to Texas and Nebraska") with annual and perennial material and noted: "In the western part of its range, it is, as a rule, perennial from a deep rootstock resembling that of *P. longifolia*, *P. macrophysa* [=*P. longifolia* var. *subglabrata* (Mack. & Bush) Cronq.] and *P. virginiana* [these all represent species native to the U.S.] ... In the East, as a rule, it is an annual with branching roots and somewhat resembles *P. ixocarpa*" [*P. ixocarpa* is not native to the U.S.].

From Rydberg's (1896: 307, 308; 336–338) writings one gets the sense that he was leaning towards treating *Physalis ixocarpa* as synonymous with *P. philadelphica.* However, he nonetheless declined to do so, treating *P. philadelphica* as native to the U.S. and circumscribing it so as to include disparate material comprised of perennials (similar to the native *P. longifolia* and *P. virginiana*) in the western region of its range and annuals (similar to the nonnative *P. ixocarpa*) in the eastern region. Rydberg's actions "saved" Lamarck's "Coqueret de Philadelphie" from having to represent a species that is not native to Philadelphia, but it did not gain widespread acceptance, Fernald (1950: 1255–1259), for example, noted that the treatment of *Physalis* was "based largely" on Rydberg's treatment but yet this treatment did not mention the name *P. philadelphica* at all!

Waterfall (1967: 213–215) in his treatment of *Physalis* for Mexico, Central America and the West Indies, treated *P. philadelphica* and *P. ixocarpa* as synonyms and adopted the earlier *P. philadelphica* as the correct name, noting: "The type of *P. philadelphica* Lamarck, in the Lamarck collections (P), is the same as *P. ixocarpa*. ... Rydberg's reference of perennial material to this taxon ... pertains to collections of the variable *P. virginiana* complex of eastern North America."

Whereas the application of the name *Physalis philadelphica* appears to now be resolved, the precise native range for this species remains somewhat uncertain. Acevedo-Rodríguez and Strong (2012: 905) reported the species as "Native to Cuba, Hispaniola, North America, Mexico, and Central America; exotic in Lesser Antilles (Nevis)" but also noted it was "considered exotic and invasive in Cuba by CeNBIO" [Centro Nacional de Biodiversidad de Cuba]. Most regional (e.g., Gleason and Cronquist 1991: 403) and state manuals (e.g., Voss 1996: 195, Rhoads and Block 2007: 849) for the U.S. treat the species as non-native but native to Mexico. PLANTS (U.S.D.A. 2015) reports the species throughout much of the U.S. and Canada but non-native throughout. Regardless of the species' original native range, it appears quite likely that it is not native to the Philadelphia area. Rather, the species was likely an early introduction, Britton (1889: 181) and Keller and Brown (1905: 282) having reported numerous records from the region, although the precise application of the name *P. philadelphica* in these works has not been carefully reviewed.

Physalis philadelphica, commonly known as Mexican husk tomato, tomatillo and jamberry, is widely cultivated (many cultivars have been developed) for its fruit, which is used in Mexican salsa verde. In Mexico and Central America, the species has been in cultivation for centuries, and it was an important food for the Mayans and Aztecs. (van Wyk 2005: 293).

05. *Aster philadelphicus* W.P.C.Barton, Fl. Philadelph. Prod.: 81. 1815 – Original material: Pennsylvania: Bucks Co.: *Pursh s.n.,* "in vicinity of Philadelphia 1805-1807". Barton herb. (PH).

= ***Symphyotrichum lateriflorum*** (L.) Á.Löve & D.Löve in Taxon 31: 359. 1982 ≡ *Solidago lateriflora* L., Sp. Pl. 2: 879. 1753 ≡ *Aster lateriflorus* (L.) Britton in Trans. N.Y. Acad. Sci. 9: 11. 1889 – Type: Not designated (Jarvis 2007: 863).

According to Rafinesque (1817), *Aster philadelphicus* is one of six new taxa described and named by William P. C. Barton in his *Florae Philadelphicae Prodromus* (1815), and one of three new asters, the other two being *A. corymbosus* var. *alatus* and *A. tenuiculus*. As noted by Rafinesque (1817), the information for each plant is presented in eight columns. The entry for *A. philadelphicus* is as follows:

Systematic Names	English, Vulgar, and Vernacular Names	Natural Families of Jussieu	Calyx	Corolla	Form of the leaves, etc.	Fruit	Time of flowering
19. Philadelphicus, [mihi.] / obs. A. tradescanti affinis.	Philadelphian,			alb.	ramis horizontalibus: foliis longuscule linearibus.		flo. Augusto.

The third, fourth, and sixth columns were generally left blank except for genera, and for *Aster* the following was reported for these three columns: Dicoty. Corymbiferae; imbric. (no doubt short for imbricate); recep. nud. papp. capill. (no doubt short for receptacle nude, pappus capillary).

Rafinesque (1817) noted the following with respect to Barton's descriptive method: "a peculiar diagnostic definition of each species is given in Latin: although these definitions are sufficiently comparative to distinguish the species of this Prodromus, it is to be regretted, that they are often too short, and that they will probably be found to be defective when the Flora of Philadelphia shall be greatly enlarged." Rafinesque (1817) went on to comment on Barton's three new species of aster, noting: "We shall not dare to pronounce on these three species of Aster; in such an extensive genus, when new species are so imperfectly noticed, they cannot be considered as ascertained."

Rafinesque (1817) was certainly correct that it is not possible to apply the name *Aster philadelphicus* based on Barton's (1815) meager diagnosis. However, based on the Pursh specimen in the Barton herbarium at PH, which is taken as original material for the name, *A. philadelphicus* is tentatively placed in the synonymy of *Symphyotrichum lateriflorum.* Barton (1815) indicated that *A. philadelphicus* was allied with *A. tradescantii* L., and there is an annotation on the Barton specimen identifying it as such. However, *A. tradescantii* has not been reported from Pennsylvania (Brouillet et al. 2006: 516; Rhoads and Block 2007: 926–934). Assigning the Pursh specimen to one of the varieties recognized by Nesom

(1994) and Semple et al. (2002) (but not recognized by Brouillet et al. 2006) is complicated by the limited material of *A. philadelphicus* and the lack of a type for *Solidago lateriflora,* the basionym of *Symphyotrichum lateriflorum* (Jarvis 2007: 863).

06. *Poa philadelphica* W.P.C.Barton, Comp. Fl. Philadelph. 1: 62. Aug. 1818, nom. superfl. et illeg. ≡ *Poa pennsylvanica* Nutt., Gen. N. Amer. Pl. 2: er[r]atum. Jul. 1818 ≡ *Megastachya obtusa* Schult., Mant. 2: 326. 1824, nom. superfl. et illeg. ≡ *Poa nuttallii* Spreng., Syst. Veg. (ed. 16) 1: 344. 1824 ("1825"), nom. superfl. et illeg. – Original material: Pennsylvania: Philadelphia Co.: *Barton s.n.,* Philadelphia, Barton herb. (PH).

= *Briza eragrostis* L., Sp. Pl. 1: 70. 1753 ≡ *Poa megastachya* Koeler, Descr. Gram. 181. 1802 (a combination based on *Briza eragrostis* L. was blocked by *Poa eragrostis* L., Sp. Pl. 1: 68. 1753) ≡ *Megastachya eragrostis* (L.) Roem. & Schult., Syst. Veg., ed. 15 bis 2: 575, in obs., 584. 1817 ≡ *Eragrostis megastachya* (Koeler) Link, Hort. Berol. 1: 187. 1827 ≡ *Eragrostis vulgaris* var. *megastachya* (Koeler) Coss. & Germ., Fl. Env. Paris 2: 641. 1845 ≡ *Eragrostis poaeoides* var. *megastachya* (Koeler) A.Gray, Man. (ed. 2): 563. 1856 ≡ *Eragrostis minor* var. *megastachya* (Koeler) Davy ex Jeps. – Lectotype (designated by Clayton in Polhill, *Fl. Trop. E. Africa, Gramineae* 2: 232. 1974): Herb. Burser 1: 10 (UPS).

= *Poa cilianensis* All., Fl. Pedem. 2: 246. 1785 ≡ ***Eragrostis cilianensis*** (All.) Vignolo ex Janch. in Mitt. Naturwiss. Vereins Univ. Wien 5(9): 110. 1907 ≡ *Eragrostis megastachya* var. *cilianensis* (All.) Aschers. & Graeb., Syn. Mitteleur. Fl. 2: 371. 1900 ≡ *Erosion ciliare* Lunell in Amer. Midl. Naturalist 4: 221. 1915, nom superfl. et illeg.

= *Eragrostis major* Host, Icon. Descr. Gram. Austriac. 4: 14, t. 24. 1809.

= *Briza purpurascens* Muhl., Descr. Gram.: 154. 1817 ≡ *Megastachya purpurascens* (Muhl.) Schult., Mant. 2 (Schultes): 326. 1824 ≡ *Calotheca purpurascens* Spreng., Syst. Veg. (ed. 16) 1: 348. 1824.

= *Eragrostis virletii* E.Fourn. ex Hemsl., Mexic. Pl. 2: 116. 1886.

– *Poa obtusa* Nutt. Gen. N. Amer. Pl. 1: 67, †fn. Jul. 1818, not accepted by author (see Nutt. Gen. N. Amer. Pl. 2: er[r]ata).

– *Briza megastachya* hort. ex Steud., Nomencl. Bot. Ed. 2. 1: 225, pro syn.

– *Eragrostis eragrostis* MacMill., Metasp. Minnesota Valley: 75. 1892 (based on *Briza eragrostis* L.), tautonym.

– *Eragrostis eragrostis* var. *megastachya* Farw. in Rep. (Annual) Michigan Acad. Sci. 17: 182. 1916 (based on *Poa megastachya* Koeler), tautonym.

Thomas Nuttall (Jul. 1818, Vol. 1: 67, †fn.) stated the following when publishing *Poa obtusa*:

> "Closely allied to the *B. Eragrostis,* (*Poa megastachya*), but readily distinguished by its unbranched weak and compressed stem, the length of its leaves, which are not involute and rigid, the scattered few-flowered panicle, and particularly obtuse points

> of the flower glumes, and lastly by the calix, in which the larger valve is 3-nerved, and consequently similar to the corolla, while the calix glumes of the *Poa megastachya* have each but a single nerve, a character which not only distinguishes it well from the present species, but also from the *P. Eragrostis,* in which the larger valve of the calix is also 3-nerved, similar to the corolla. Hab. Collected in the neighbourhood of Philadelphia, by Dr. W. Barton, professor of botany."

In the protologue for *Poa philadelphica,* Barton (Aug. 1818 Vol. 1: 62–63) provided a description for the species, repeated from Nuttall the paragraph quoted above, and further stated: "I detected this plant in the neighborhood of this city two years ago, and gave specimens to Mr. Nuttall, who has described it as above. I have changed his specific name, because it was previously given by *Muhl.* to No. 12. [*P. obtusa* Muhl.]." Therefore, *P. philadelphica* was published as a replacement name for Nuttall's *P. obtusa.*

However, Barton apparently did not know that Nuttall (Jul. 1818 Vol. 2: er[r]atum) previously had realized that his proposed "*Poa obtusa*" would have turned out to be a later homonym of *P. obtusa* Muhl., and he replaced it with the name *P. pennsylvanica* in the erratum (spelled "eratum") at the end of Volume 2 of *The Genera of North American Plants.* Since the two volumes were published at the same time they constitute a single work, and Nuttall's "*P. obtusa*" was not validly published as it was not accepted by Nuttall at the time of publication (McNeill et al. 2012: Art. 36.1(a)), since the author proposed in the erratum to replace "*P. obtusa*" with *P. pennsylvanica.* Thus, Nuttall (Jul. 1818 Vol. 2: er[r]atum) validly published the name *P. pennsylvanica* for his new species. Barton's (Aug. 1818 Vol. 1: 62) *P. philadelphica*, therefore, is a superfluous and illegitimate renaming of *P. pennsylvanica.* Likewise, *Megastachya obtusa* Schult. and *P. nuttallii* Spreng. are superfluous and illegitimate renamings of *Poa pennsylvanica* Nutt.

Nomenclature aside, Nuttall's taxonomy, recognizing as distinct from *Briza eragrostis* L. (=*Eragrostis cilianensis* (All.) Vignolo ex Janch.) a species (*Poa pennsylvanica*) based on the stem, leaf, inflorescence, and floret characters given by Nuttall, was also never adopted. Indeed, save for Hitchcock and Chase (1950: 866), I was unable to find any other flora or taxonomic treatment that accounts for the names *P. pennsylvanica* Nutt. or *P. philadelphica* W.P.C.Barton.

Eragrostis cilianensis is native to Europe, but was an early introduction into the eastern U.S., there being records for this species in Britton (1889: 293), Keller and Brown (1905: 49), and Stone (1911: 237). Taking the material on which *Poa philadelphica* was based as conspecific with *E. cilianensis* makes *Poa philadelphica* another example, like *Physalis philadelphica*, of a non-native species being originally described as a native species.

07. "*Ipomoea philadelphica*" hort. ex Roem. & Schult., Syst. Veg., ed. 15 bis 4: 236. 1819, pro syn.

= ***Ipomoea ×leucantha*** Jacq., Icon. Pl. Rar. 2: tab. 318. 1788, pro sp.

In their treatment of *Ipomoea leucantha*, Roemer and Schultes (1819: 236) included "*I. philadelphica* Hortorum" as a synonym. Thus, the name was not validly published in this work as it was not an accepted name (McNeill et al. 2012: Art. 31.1(c)). A review of the taxonomic literature has not turned up any other references where "*I. philadelphica*" was validly published. Austin and Huáman (1996: 31) indicated "*I. philadelphica*" to be synonymous with *I.* ×*leucantha* Jacq.

Ipomoea leucantha Jacq. was originally published as a species by Jacquin (1788: tab. 318). More recently it has been treated as a hybrid representing crosses between *I. cordatotriloba* Dennst. and *I. lacunosa* L. (Duncan and Rauscher 2013). Assuming "*I. philadelphica*" was used in the 1800s in horticulture to represent *Ipomoea* ×*leucantha*, this represents, like *Physalis philadelphica* and *Poa philadelphica*, another case of a Philadelphia toponym representing a plant that is likely not native to the Philadelphia region, *I.* ×*leucantha* not being reported from Delaware, New Jersey or Pennsylvania. Regarding the hybrid's parents, *I. cordatotriloba* is not known north of North Carolina (U.S.D.A. 2015) and *I. lacunosa* is taken as native to Delaware (Tatnall 1946: 212) and Pennsylvania (Fernald 1950: 1180, Gleason and Cronquist 1991: 409, Rhoads and Block 2007: 844) but native (Hough 1983: 189, Gleason and Cronquist 1991: 409) or non-native to New Jersey (Britton 1889: 179, Stone 1911: 653 †fn.).

08. *Calycanthus philadelphicus* Sommé in Messager Sci. Arts Gand. 1825: 394. Dec. 1825 or 1826 – Original material: none known.

= ***Calycanthus floridus*** L., Syst. Nat., ed. 10. 2: 1066. 1759 – Lectoype: (designated by Nicely in *Castanea* 30: 66. 1965): *Miller,* Herb. Linn. No. 660.1 (LINN; isotype: BM).

The following passage is from Sommé (Dec.1825 or 1826: 394) with the description of *Calycanthus* in bold:

> "Dans beaucoup de jardins on cultivé depuis long-temps le Calycant de la Floride; ses fleurs nombreuses, d'une couleur pourpe, ont l'odeur de l'Ananas; son bois est odoriférant; il forme des buissons élevés lorqu'ilest placé à l'ombre dans une terre humide; plusieurs autres espèces se trouvent ici; **le *Calycanthus philadelphicus,* porte des fruits en forme de poire longue, anguleuse; c'est le calice épaissi et succulent, renfermant les semences**; une autre espèce étiquetée sous le nom de *C. incisa,* donnait aussi des fruits d'une forme plus arrondie et moins grands, ils parviendront cette année à leur maturité; les autres, tels que le *C. nanus,* variété du *C. laevigatus,* les *C. purpurescens* [sic], *ferax* et *pensylvanica,* n'en avaient pas produit."

Steudel (1840: 262) attributed the name *Calycanthus phyladelphicus* to Louis Claude Noisette (1772-1849), French botanist and agronomist. However, I could find no publication by Noisette where the name was used. The name was used in early horticultural literature with Sommé (Dec. 1825-1826) being the only reference where the name was accompanied by a description and thus validly published. Sommé's description is scant, and does not distinguish the material from typical *Calycanthus floridus* L., the species likely to be involved, since it is the only species frequently encountered in the eastern U.S.

Calycanthus floridus is generally not taken as native to the Philadelphia region, being native only north to Virginia (Fernald 1950: 677, Rhoads and Block 2007: 402 as "native mostly VA to FL"). Thus, assuming that the material that went under the name *Calycanthus philadelphicus* (*phyladelphicus*) represented some garden variety of *C. floridus, C. philadelphicus,* like "*Ipomoea philadelphica,*" *Physalis philadelphica*, and *Poa philadelphica*, is another example of a Philadelphia toponym representing material that was not native to Philadelphia.

09. ***Panicum philadelphicum*** Bernh. ex Nees., Fl. Bras. Enum. Pl. 2: 198. 1829 (Trinius, Gram. Panic.: 216. 1826, pro syn.) ≡ *Panicum capillare* var. *philadelphicum* (Bernh. ex Nees) Steud., Nomencl. Bot. Ed. 2. 2: 254. 1841 – Type: Pennsylvania: Philadelphia Co.: *J. J. Bernhardi s.n.*, Trinius herbarium (MW, PH) (for a discussion of the specimen, see Hitchcock and Chase 1910: 58).

= *Panicum capillare* var. *sylvaticum* Torr., Fl. N. Middle United States: 149. 1824 (non *P. sylvaticum* Lam.) ≡ *Panicum torreyi* E.Fourn. in Hemsl., Biol. Cent.-Amer., Bot. 3: 497. 1885.

= *Panicum capillare* var. *minimum* Engelm. in Vasey, Grasses U.S.: 11. 1883 (nomen: Gattinger, Fl. Tenn.: 94. 1887) ≡ *Panicum minimum* (Engelm.) Scribn. & Merr., Circ. Div. Agrostol. U.S.D.A. 27: 4. 1900.

Panicum philadelphicum is closely related to *P. capillare,* but is readily distinguished from *P, capillare* by its panicles being less than one-half the height of the plant (as opposed to more than one-half), the base of the peduncle not breaking off at maturity (as opposed to breaking thus making the plant a tumbleweed), and the spikelets being 1.4-2.4 mm. long (as opposed to 1.9-4 mm. long) (Freckmann and LeLong 2003: 459). Since Trinius's (1826: 216) description, the species has usually been held as distinct from *Panicum capillare* and the application of the name has remained stable. The only taxonomic disagreement regarding the species has been whether certain segregates (e.g., *P. gattingeri* Nash, *P. lithophilum* Swallen, *P. tuckermanii* Fernald) originally included within a broadly circumscribed *P. philadelphicum* should be recognized as distinct species, subspecies or varieties.

The species is wide-ranging, occurring throughout much of the eastern U.S., and Canada in fields, roadsides, and open woodlands. The species is widespread in the Philadelphia region, but is not common (Keller and Brown 1905: 36, Stone 1911: 195, Tatnall 1946: 41, Hough 1983: 259, Rhoads and Block 2007: 384).

The authorship and publication of valid publication for *Panicum philadelphicum* is often cited as Trinius in *De Graminibus Paniceis* (1826: 216.) (e.g., Freckmann and LeLong 2003: 459). However, whereas Trinius did mention *P. philadelphicum* and provide a description for it, he did not accept this species but rather treated it as a synonym of *P. capillare* L. Thus, the name cannot be taken as validly published by Trinius in the 1826 publication. It was clearly validly published by Nees in 1829. See Hitchcock and Chase (1910: 58) and Fernald (1919: 112) for further discussion of this issue.

10. "*Phlox philadelphica*" Hort. in Gard. Mag. & Reg. Rural Domest. Improv. 6: 604. 1830; Steud., Nomencl. Bot., Ed. 2. 2: 323. 1841, nom. nud.

The earliest reference for the name *Phlox philadelphica,* is a notice, with no description of the plant, that it had been introduced into Ireland (Anonymous 1830: 604). The second, and only other, reference found is from Steudel (1841: 323) and is as follows: "philadelphica Hort. ♃ Amer. sptr." The name *Phlox philadelphica* cannot be taken as validly published by Steudel since there was no description, Steudel's indication that the species was a perennial (through the use of the tin sign) being insufficient. With no description in the literature, the name cannot be taken as validly published and cannot be applied since there is also no material associated with the name.

11. "*Coreopsis philadelphica* Ludd.," Schlechtendal, Litteratur-Bericht für das Jahr 1826-1842: 77. 1835, pro syn.; "*Coreopsis philadelphica*" Donkelaer in Nouv. Mém. Acad. Roy. Sci. Bruxelles 16: 73. 1843, nom. nud.; "*Coreopsis philadelphica*" Anonymous. 1866. *Gard. Chron.* 47-1866: 1112, nom. nud.; "*Coreopsis philadelphica* L.," B.D.Jacks., Index Linn. Herb.: 62. 1912, nom. nud.

"*Coreopsis philadelphica* Ludd." was published by Schlechtendal (1835: 77). The name appeared in the treatment of *Actinomeris oppositifolia,* with the author noting "Ad amussim nostrae speciei respondere videtur *Coreopsis philadelphica* Lodd., cujus semina ex horto bot. Darmstadiensi accepimus." Schlechtendal's "Lodd." refers to Conrad Loddiges (1738-1826), a Dutch-born horticulturist who worked in England.

"*Coreopsis philadelphica*" was published again in 1843 by Donkelaer (1843: 73) in a list with no further information. It was again published (1866: 1112), apparently anonymously, in a seed list with the following statement: "Perennial composite, which flowers the first year when sown; its large flowers are of a fine yellow and very ornamental." Even though the Code's (McNeill et al. 2012: Art. 30.6) ban on effective publication of names in non-scientific newspapers is limited to publications after 1953, I don't think this meagre description conforms to Art. 38.3 (McNeill et al. 2012). A description cannot consist of "statements describing properties such as purely aesthetic features, economic, medicinal, or culinary use, cultural significance, cultivation techniques, geographical origin, or geological age."

"*Coreopsis philadelphica*" was published by Jackson (1912: 62) in his *Index to the Linnean Herbarium.* Therefore, the name can be attributed to Linnaeus. In the entry there was also "MS," indicating that Jackson likely saw an unpublished manuscript in which this name was used by Linnaeus or attributed to Linnaeus. However, this is all that accompanied the name, and therefore it must also be taken as a nomen nudum in this publication.

There is a sheet (1026.4) labelled "*Coreopsis philadelphica*" (image available at: http://linnean-online.org/10573/) at LINN. Sir James Edward Smith (1759-1828) annotated the specimen as "[*Coreopsis*] *coronata*?" and Asa Gray (1810-1888) annotated it as "*Coreopsis trichosperma* Mx." The material appears to be a specimen of what would currently be called *Bidens trichosperma* (Michx.) Britton. The earliest name for this species is *Coreopsis coronata* L. (Sp. Pl. 2 (ed. 2): 1281. 1763) and the species when placed in *Bidens* L. has long gone under the name *B. coronata* (L.) Britton (in Bot. Gaz. 56: 495. 1913). However, Britton's combination is a later homonyn of *B. coronata* Fisch. ex Colla (Herb. Pedem. 3: 306. 1834), thus making *Bidens trichosperma* (Michx.) Britton (in Bull. Torrey Bot. Club 20: 281. 1893) the earliest available legitimate name in *Bidens* for this species. Should one, like Britton, want to maintain *Coreopsis coronata* L. and *Coreopsis trichosperma* Michx. (Fl. Bor.-Amer. 2: 139.1803) as distinct species in *Bidens,* further research would be needed to determine the correct name for what Britton had called *B. coronata.* It's possible that Linnaeus was planning to (but never did) recognize the two as distinct species in *Coreopsis* using the names *C. coronata* and *C. philadelphica.* Confirming this, however, would require reviewing Linnaeus's unpublished materials.

12. *Crataegus philadelphica* Sarg. in Proc. Acad. Nat. Sci. Philadelphia 57: 588-589. 1905 ≡ *Crataegus pruinosa* var. *philadelphica* (Sarg.) Eggl. in Rhodora 10: 81. 1908 – Original material: Pennsylvania: Philadelphia Co.: *B.H. Smith 194,* 1901, Island Road, Kingsessing, West Philadelphia (PH).

= **Crataegus pruinosa** (H.L. Wendl.) K. Koch, Hort. Dendrol.: 168. 1853 ≡ *Mespilus pruinosa* H.L. Wendl. in Flora 6(2): 710. 1823.

Besides a lengthy and detailed description, Sargent (1905: 589) characterized *Crataegus philadelphica* as follows: "A broad shrub with numerous erect stems 3–4 m. high, and slender nearly straight branchlets marked by many pale lenticels, dark red-brown and covered with a glaucous bloom when they first appear, darker and very lustrous during their first winter, dark gray-brown the following year and armed with nearly straight slender red-brown lustrous spines 3.5-5 cm. in length."

Based on the type material, *Crataegus pruinosa* is clearly close to *C. pruinosa* (H.L. Wendl.) K. Koch, hence Eggleston's (1908: 81) treating it as a variety. Fittingly, *C. philadelphica* was recognized in Keller and Brown (1905: 187). However, floras since then have not recognized *C. philadelphica* and have not cited it in synonymy (e.g., Fernald 1950: 767–801, Gleason and Cronquist 1991: 264–268, Rhoads and Block 2007: 643–648, Phipps 2014: 491–643), presumably (implicitly) treating it as a synonym of *C. pruinosa.*

13. *Rubus philadelphicus* Blanch. in Torreya vii: 56. 1907 – Lectotype (designated by L.H.Bailey in Gentes Herb. 5: 714. 1945): New Jersey: Camden Co.: *W.H. Blanchard s.n.,* Haddonfield (GH [2 sheets]).

= **Rubus pennsilvanicus** Poir., Encycl. 6(1): 246. 1804.

In his original description Blanchard (1907: 56) provided a detailed description of both the primocanes and floricanes, and noted the species produced a "fine crop of large, early, much esteemed fruit." Blanchard (1907: 56) further characterized the species as belonging to the *Rubus frondosus* Bigel. group and noted: "Though it often makes a large plant, it is seldom as tall as *R. Andrewsianus* and in general appearance is a sort of "half high" or intermediate between *R. procumbens* and *R. Andrewsianus.*" Blanchard (1907: 57) stated the species was "a very abundant plant in the neighborhood of Philadelphia and Lancaster, Pennsylvania, and quite as abundant around Washington, D.C."

Liberty Hyde Bailey (1945: 713-714) recognized this species and expanded the range to Massachusetts, Rhode Island, southern Connecticut, eastern and western New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, and Virginia. He further noted, "Some of the collections on which these distributions are based may eventually be separated as another species... ."

When it came to blackberry (*Rubus* L. subg. *Rubus*) taxonomy William H. Blanchard (1850-1922) was from the school of Liberty Hyde Bailey (1858-1954), and he described over 50 new blackberry species and varieties, chiefly from the northeastern U.S. Liberty Hyde Bailey was responsible for introducing approximately 450 names of new blackberry species and varieties, chiefly from North America.

However, when it came to incorporating many of these new species, which were oftentimes described as though they were clear as day, into regional floras, many of their species never saw the light of day as they were either synonymized or ignored. Fernald (1950: 822–864) tried to accommodate many of the new species proposed by L. H. Bailey and Blanchard but was forced to acknowledge the obvious in a footnote (p. 822): "Taxonomically a most difficult group." The *Rubus* treatment in Gleason and Cronquist (1991: 248–253) recognized only two species (*Rubus orarius* Blanch., *R. recurvicaulis* Blanch.) and Rhoads and Block (2007: 620–626) recognized only one (*R. recurvicaulis* Blanch.). The treatment in the *Flora of North America North of Mexico* (Alice et al. 2014: 28–56) recognized none of the species proposed by Blanchard and L. H. Bailey. Regarding *Rubus philadelphicus,* when it is cited in synonymy (Fernald 1950: 861, Gleason and Cronquist 1991: 253, Alice et al. 2014: 50), it is included within *Rubus pennsilvanicus* Poir. (fittingly from a geographic standpoint!).

Other organisms

No toponyms for Philadelphia, Pennsylvania, were found for nonvascular plants (hornworts, liverworts, mosses), ferns and fern allies, gymnosperms or fungi.[2] One alga,

Table 3. Twenty names of animals identified as likely toponyms for Philadelphia, Pennsylvania. Currently accepted names are in bold font.

Bledius philadelphicus Fall 1919 (Coleoptera, rove beetle)

Bombylius philadelphicus Macquart 1840 = ***B. mexicana*** (Diptera, bee fly)

Calligrapha philadelphica (Linnaeus 1758) (Coleoptera, leaf beetle)

Cambarincola philadelphicus (Leidy 1851) ≡ *Astacobdella philadelphica* Leidy 1851 ≡ *Bdellodrilus philadelphicus* (Leidy 1851) ≡ *Branchiobdella philadelphica* (Leidy 1851) (Annelida, crayfish worm)

Centropristis philadelphica (Linnaeus 1758) ≡ *Perca philadelphica* Linnaeus 1758 (Vertebrata, fish, rock sea bass)

Chroicocephalus philadelphia (Ord 1815) ≡ *Larus philadelphia* (Ord 1815) ≡ *Sterna philadelphia* Ord 1815 (Vertebrata, bird, Bonaparte's Gull)

Eristalis philadelphicus Macquart 1842 = ***Eristalis transversa*** Wiedemann 1830 (Diptera, syrphid fly)

Exoprosopa philadelphica Macquart 1840 = ***Exoprosopa fascipennis*** (Say 1824) (Diptera, bee fly)

Geothlypis philadelphia (A. Wilson 1810) ≡ *Oporornis philadelphia* (A. Wilson 1810) = *Sylva philadelphia* A. Wilson 1810 (Vertebrata, bird, Mourning Warbler)

Gonia philadelphica Macquart 1844 = ***Gonia frontosa*** Say 1829 (Diptera, tachnid fly)

Holopogon philadelphicus Schiner 1867 = ***Holopogon guttulus*** (Wiedemann 1821) (Diptera, robber fly)

Homoneura philadelphica (Macquart 1843) ≡ *Sapromyza philadelphica* Macquart 1843 (Diptera, beach fly)

Isodontia philadelphica (Lepeletier de Saint Fargeau 1845) ≡ *Sphex philadelphicus* Lepeletier de Saint Fargeau 1845 (Hymenoptera, wasp)

Lycosa philadelphiana Walckenaer 1837 (Arachnida, wolf spider)

Melissodes philadelphica (Lepeletier de Saint Fargeau 1841) = *Macrocera philadelphica* Lepeleter de Saint Fargeau 1841 (Hymenoptera, bee)

Phormia philadelphica Robineau-Desvoidy 1830 = ***Phormia regina*** (Meigen 1826) (Diptera, blow fly)

Proctacanthus philadelphicus Macquart 1838 (Diptera, robber fly)

Promachus philadelphicus Schiner 1867 = ***Promachus bastardii*** (Macquart 1838) (Diptera, robber fly)

Syrphus philadelphicus Macquart 1842 = ***Syrphus ribesii*** Linnaeus (Diptera, syrphid fly)

Vireo philadelphicus Cassin 1851 (Vertebrata, bird, Philadelphia Vireo) a diatom, was named for Philadelphia, *Cymbella philadelphica* Boyer (Diatomaceae Philadelph.: 63; Pl. 18, Fig. 8. 1910). Boyer characterized the species as "rare" and from "blue clay" in Philadelphia. Regarding animals, twenty (twelve in current use; eight synonyms) likely Philadelphia toponyms have been identified (see Table 3) but are not reviewed.

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[2] The moss genus *Hyophiladelphus* (Müll. Hal.) R.H.Zander (≡ *Barbula* sect. *Hyophiladelphus* Müll. Hal.) has nothing to do with Philadelphia or *Philadelphus* L., but rather is derived from the moss genus *Hyophila* Bridel and the Greek word *adelphos* (brother).

Summary

Thirteen names of species of flowering plants were identified as being toponyms for Philadelphia, Pennsylvania, with only four (*Erigeron philadelphicus, Lilium philadelphicum, Panicum philadelphicum, Physalis philadelphica*) being in current use, the other nine either treated as synonyms or not validly published and unavailable. No names of species of nonvascular plants, ferns or fern allies, or gymnosperms were identified as Philadelphia toponyms. One name of an alga (diatom), *Cymbella philadelphica*, is a Philadelphia toponym. Twenty names of animals (two bees/wasps, two beetles, three birds, one fish, ten flies, one spider, one worm) were identified that are likely toponyms for Philadelphia, with eleven in current use, the other eight (all flies) being synonyms. Numerous names were identified that can be mistakenly identified as honoring Philadelphia, Pennsylvania but that actually refer to another Philadelphia or the plant genus *Philadelphus* L., which was not named in honor of Philadelphia (some of these are discussed in the Introduction). In total, thirty-four Philadelphia toponyms have been identified in biological nomenclature, of which seventeen are in current use.

Acknowledgments

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Bartonia No. 69: 118–119, 2016

In Honor of Alfred E. Schuyler

ELIZABETH MCLEAN

We are honoring Alfred Ernest Schuyler, the highly respected systematic botanist, field botanist, *Scirpus* expert.[1] But more particularly we are honoring "Ernie," our friend, supporter and — especially — our mentor. Ernie's' CV does not describe the man — anymore than do his roller blades — or his Henny Youngman's jokes.

Ernie is known for mentoring decades of young botanists: encouraging them to dig more deeply. While I am a fellow mentee, I suspect I am Ernie's only one who is a landscape historian. But, I have profited from Ernie's counsel — and patience — for almost 40 years. We all have great Ernie stories, and I tell some of my experience to share the depth and breath of the kind of support Ernie has given us: the things that are NOT on his resume, the things that make Ernie, "Ernie."

In the winter of 1977, as a freshly minted graduate of the Barnes Arboretum School with a rather basic knowledge of botany, I volunteered to work in the Type Collection of the Botany Department at the Academy of Natural Sciences[2]. Ernie introduced me to this amazing collection, in the same room with Lewis and Clark specimens. Through Ernie I found how very much one could learn by looking at 200-year-old dead plants!

Of course he got me involved in the Philadelphia Botanical Club, which was struggling somewhat then, and then somehow I became President, and we worked on boosting membership. Ernie's' support for the Botany Club has been continuous. Besides the Botany Club, there are just three of many areas of Ernie's support and influence I would like to mention: libraries, travel/botanizing, and — of course — research.

First, libraries seem always to need help, but the library at the Academy has had some particularly lean years, so Ernie chaired Friends of the Library, and organized talks and mini exhibits for the members. He continues to encourage appropriate donations to the library, and even picks them up.

Secondly: traveling and botanizing with Ernie. To walk in the field with Ernie is to sharpen the connection between ones eyes and ones brain, whether walking in the Pine Barrens, whether following the Bartram Trail down the East Coast, or — more recently — botanizing in northern Nunivak. A slightly different expedition was to follow the Lewis and Clark Trail in Montana.[3] This was for an exhibit of Lewis and Clark for the Academy at the Philadelphia Flower Show in 1998. This involved picking and photographing sites, and making specimens; Ernie created the plant list.[4] My major job was to locate the plants in western nurseries and get them forced in Philadelphia to be in the proper state for the Flower Show in 1998. It was a great success.[5]

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[1] Ernie, along with his wife Pat, is also an excellent vegetable gardener with a plot in local community garden, and a particularly fine crop of *Capsicum annum*, *C. baccatum*, *C. chinense*, *C. exile*, *C. frutescens* and *C. pubescens*.

[2] Now the Academy of Natural Sciences of Drexel University.

[3] This was just before Ernie took a Lewis and Clark's tobacco specimen to the White House in November 1997.

[4] On this trip I first learned some of the finer points of craft beers from Ernie.

Third and finally, there are two major research stories, out of many, that I want to tell. The first is about the Bartram Tercentenary Celebration. It would never have happened without Ernie. He brought up the subject early in 1997. Bartram's Garden was alerted; a strong committee was formed under Nancy Hoffmann; the symposium then was organized, with speakers from both sides of the Atlantic.[6,7] Nancy Hoffman and John Van Horne were asked to be co-editors of the ensuing book*: America's Curious Botanist: A Tercentennial Reappraisal of John Bartram (1699-1777).* Ernie was there all the way, suggesting, and encouraging. I was not able to be at the symposium, and when Ernie felt there was not enough about John Bartram's discovery of new plants, he added a chapter, "The Versatile Bartrams and Their Enduring Botanical Legacy." He gave me joint credit because the subject was "inspired" by an earlier article of mine. So like Ernie: giving someone else the credit.

The second story is about the biography of Peter Collinson that I coauthored with the late Jean O'Neill.[8] Neither of us had written more than journal articles before. Ernie volunteered to examine the "next to final" draft, and felt — quiet rightly — that it was not strong enough on botany or Collinson's connection with Linnaeus. Ernie found illustrations of which I was unaware, as well as new sources I could follow. Ernie made a time line of Collinson's life, as well as a list of the fifteen orchids in his garden for the appendix. The book was a much better book than it would have been without Ernie, and of course, I learned a great deal in the process.

Those of us who have had the opportunity to work with Ernie have had the chance to "learn a great deal in the process." As a result our lives have been enriched. Thank you, Ernie.

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[5] Ernie had contributed to the Flower show in 1996, its first year in the new Convention center. The main exhibit included Bartram's Garden. Ernie created a "John Bartram specimen," on appropriate paper to go in, "Bartram's study."

[6] The committee consisted of Nancy Hoffman chair, Ernie, Martha Wolfe (then CEO of Bartram's Garden) Janet Evans (Librarian of the Pennsylvania Horticultural Society) Elizabeth Farley (Philadelphia Botanical Club) Rick McCourt (the Academy of Natural Sciences), and myself.

[7] Nancy E. Hoffman and John C. Van Horne, Eds. 2004. *America's Curious Botanist: A Tercentennial Reappraisal of John Bartram (1699-1777).* American Philosophical Society, Philadelphia. Published in Cooperation with the Library Company of Philadelphia and the John Bartram Association. 227 pp.

[8] Jan O'Neill and Elizabeth P. McLean, 2008. *Peter Colliinson and the Eighteenth-Century Natural History* Exchange. American Philosophical Society, Philadelphia. 216 pp.

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Ernie Schuyler, an Appreciation

HENRY A. HESPENHEIDE

Professor Emeritus of Ecology, Department of Ecology and Evolutionary Biology
University of California, Los Angeles

In the fall of 1964 I arrived at the University of Pennsylvania as a graduate student in bird ecology, but I also came with interests in insects and plants. At Duke University I had minored in botany, done independent research in plant taxonomy, and had taken part in two collecting trips to the West Indies where I had developed an interest in a genus of orchids. All four areas of interest — ecology, birds, insects and plants — took me to the Philadelphia Academy of Sciences, which then had connections with Penn, but especially to the herbarium to continue my side project on orchids. Ernie Schuyler generously became my informal mentor in what became a dissertation-sized project revising and describing a flora of almost 100 species. Unfortunately, little remains in my memory of the details of that period, which is amazingly now 45-50 years in the past, but I would like to acknowledge here Ernie's assistance during my five years in Philadelphia.

In retrospect, it was very arrogant of me to assume that I could go to the Academy and have Ernie's assistance for my project, which eventually involved loans of specimens, additional collecting trips to Jamaica and Hispaniola, visits to herbaria in London, and the preparation of four manuscripts. In addition to extensive editorial assistance in the preparation of the manuscripts, Ernie arranged for publication of three of them in the *Proceedings of the Academy of Natural Sciences of Philadelphia* and *Notulae Naturae.* None of this was part of his job description at the Academy, and in fact it took him away from his real work. There are not that many people who would take the time and effort that he did when someone walks into his office and says, in effect, "Here I am — what can you do for me?" But Ernie was critically helpful in all parts of my project and very good-natured about it in ways that, in retrospect, I did not fully appreciate at the time and frankly took too much for granted.

In subsequent years I had to give up orchids in favor of ecology and tenure. My research moved from birds to insects, and eventually back to taxonomy, but of the insects, not orchids. A number of species of beetles that I study mine the leaves of plants in the family Cyperaceae, long-time subjects of Ernie's research. I have a number of new Central American species to describe and it was my intention to have described and named one in honor of Ernie before this event today. I hope it will happen within the not-too-distant future. It would be a nominal appreciation in both senses of the word. Ernie had a significant part in my becoming the biologist that I am, and all out of his good-natured generosity. I now finally acknowledge that, Ernie: Thank you.

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Personal Perspectives on Peace, Botany, and The Academy of Natural Sciences of Philadelphia

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As Conscientious Objectors, we were affected profoundly by the Vietnam War. We are grateful to Dr. Alfred E. Schuyler ("Ernie") and the Academy of Natural Sciences ("the Academy") for the important role they played during this period of our lives. To commemorate their contributions, we provide the following personal accounts that perhaps transcend the individuals and institution and provide a broader perspective of the times.

I first met Ernie Schuyler in the spring of 1970 through Dr. Ralph Good, my undergraduate botany professor and staff supervisor at Rutgers University. I was about to graduate and in need of a job, while I also undertook the process of applying for the Selective Service status of Conscientious Objector (CO) upon being drafted for military service during the Vietnam War. This is a significant part of my life's story, including how Ernie became an important mentor and friend to me and other youth. Ernie's sincere interest in botanical education and his enthusiastic focus on the rich, significant, but imperiled local flora of the Philadelphia area, at a critical time of change and growing concern for the environment, inspired many students. I had worked for Ralph Good as a herbarium assistant while I was completing my degree and Ralph suggested I ask Ernie, Curator of Botany at the Academy of Natural Sciences of Philadelphia, if he would be interested in employing me as a herbarium assistant for the summer of 1970. At the time, I was applying for a CO status and planned to enter a graduate program in teaching science at Temple University that included a full-time teaching load at a local high school. Happily, Ernie said yes, and a new chapter in my life began!

It is important to recall that the 1960s and early to mid-1970s was a tremendous period of social and environmental change. The Environmental Movement became nationally visible upon the convening of the first Earth Day on April 22, 1970, partly in response to the Santa Barbara oil spill, which followed Rachel Carson's earlier alarm for environmental degradation with the publication of *Silent Spring* in 1962. Profound social change was already underway due to the organized efforts of the Civil Rights Movement, in addition to the progressive changes initiated through the Women's and Gay Rights movements, and improvements in the work place as a result of efforts by Labor Unions. Some of these efforts were institutionalized by government with passing and implementation of the Civil Rights Act of 1964 and Voting Rights Act of 1965; the National Environmental Policy Act (NEPA) of 1970; the National Oceanographic and Atmospheric Administration authorization in 1970; the Occupational Health and Safety Act of 1970; the Clean Water Act of 1972; and the Endangered Species Act of 1973. Passage of important local legislation, such as the New Jersey Wetlands Protection Act of 1970 and New Jersey Endangered Species Conservation Act of 1973, also were enacted in response to critical environmental concerns including habitat degradation and loss, endangerment of sensitive species, and impacts to ecosystem functions in the Mid-Atlantic region.

I think it is appropriate to emphasize this broader context of my employment and that of other young scientists at the Academy and in the Botany Department. The increasing pubic desire for improvements in environmental justice, social justice, and peace was in full play during my personal decision to work for change as the goal of my alternate service as a CO. Even more important on an institutional level, however, upon receiving my classification as a CO in 1971 while teaching at a local high school, Ernie and I worked to have ANSP approved as a place for COs to perform their alternate service to military service. Subsequently I was hired in the Botany Department as a herbarium assistant to fulfill my alternate service obligation under Ernie's guidance. During a period of two years in the early 1970s, and for several years thereafter, I also worked with Ernie to further some of his research interests that also became my research interests, in particular the pursuit of the little-known freshwater and brackish water intertidal flora of river systems in the vicinity of Philadelphia. We published several papers in which the results of our work provided important insights into the flora and ecology of tidal river systems and estuaries of the mid-Atlantic region, which also helped in the conservation of several significant natural areas in the region.

While working with Ernie following my alternate service, I completed a Master's Degree in Biology with Ralph Good as my major professor. Subsequently for 26 years following my employment at the Academy, I was employed at the University of California, Santa Barbara where I worked through the academic maze to become the Executive Director of the Museum of Systematics and Ecology and the Director of Carpinteria Salt Marsh Reserve. I also served for several years as editor of Madrono and as President of the California Botanical Society, both of which I attribute directly to the guidance Ernie Schuyler and Ralph Good provided. During this post-Academy period, I studied and published on the wetlands and other sensitive habitats of central and southern California and specialized in the taxonomy of the genus *Suaeda* (Chenopodiaceae) — another clear result of the influences both of these gentlemen, scientists, and mentors provided over 40 years ago. Today, I participate in the Flora of New Jersey Project and continue my study of wetland ecosystems and flora of the western United States and Mexico.

I am grateful for the opportunities and training provided by the Academy that profoundly influenced my life and that has influenced the lives of many young people who have passed through the halls and worked in the collections and labs at this important institution. I am especially grateful, however, to Ernie Schuyler for supporting the goals of a young Conscientious Objector who proposed to contribute to the understanding, conservation, and enhancement of the Earth's biodiversity and ecology, rather than participating in war.

Wayne R. Ferren Jr.

I first met Ernie Schuyler in 1968 while I was a botany student at Swarthmore College and he was a visiting professor teaching a plant taxonomy course. I arrived in the class two weeks late because I had been committing civil disobedience in North Vietnam by delivering medical supplies to civilians injured by U.S. bombs. Ernie was hesitant to take me in the class because I had missed the early lectures and labs; nevertheless, he agreed to see if I could actually catch up with the work. It later turned out that this wasn't the first time that my commitment to protesting the war in Vietnam provided potential interference with my interest in botany. And it wasn't the first time that Ernie's graciousness was beneficial to me.

I did manage to get a B in the class! I knew that I wanted to learn more than had been possible for me in that abbreviated semester, so the following spring I asked Ernie if I could attend some of his lectures in the same course to see if I could pick up some of what I missed the first time around. After a few weeks Ernie mentioned to me that there was the possibility that I could work for him in the summer helping with his research on the genus *Scirpus* (Cyperaceae). I readily accepted the offer, and spent several weeks learning to make microscope slides of cross sections of leaves, stems and rhizomes.

Because of my passion to do what I could to bring non-violent public pressure to end the war in Vietnam, I decided that I would refuse to cooperate with the Selective Service System that was drafting men to fight in Vietnam. Within a few months of my graduating from Swarthmore in 1970, I had been indicted and sentenced to 2 ½ years in Federal prison. Although I enjoyed working on some of the prison farms that produced food for the inmates, my thoughts mostly strayed far away from botany!

However, in the spring of 1972 Ernie happened to see a newspaper article indicating that I was to be released on parole after serving 16 ½ months in prison. He wrote me a letter asking if I would be interested in working as the herbarium supervisor at the Academy of Natural Sciences in Philadelphia. Although I had no idea what I wanted to do with my life at that point, I happily accepted the offer.

Almost immediately upon starting work in the herbarium, my peace movement commitment once again threatened to prevent my work with Ernie. I had informed the Internal Revenue Service that I could not in good conscience pay taxes that funded the Vietnam War. I told the IRS that I would instead make donations to charitable causes that helped people rather than killing them. I therefore told the IRS and my new employer, that I was claiming as dependents enough Vietnamese that the war taxes would not be withheld. Apparently one of the administrators strongly objected to my stance, and informed Ernie and higher administrators that I should be fired. Ernie, however, held his ground, saying that my actions outside of my work performance were not relevant to my employment, and his point of view prevailed. Whether or not Ernie agreed with my somewhat radical political positions was never an important part of our conversation. It was Ernie's integrity that allowed him to separate my politics from my work in the botany department.

Later, as I became more aware of the growing environmental movement, I was influenced by Barry Commoner's argument in *The Closing Circle* that a society that consistently put private profits ahead of the public good was causing great damage to the earth's ecosystems. Ernie encouraged me to attend graduate school at Rutgers University while still working in the botany department. I later obtained my masters degree in ecology from Rutgers.

For many years I led a bifurcated life of teaching biology part-time at Community College of Philadelphia while working part-time for UPS in order to help build the reform movement within the Teamsters Union. But in my mind there always was a connection between these two areas of work: the powerful truths of ecological science could not be fully implemented by our society unless movements such as organized labor could unite with the environmental movement and the peace movement to persuade politicians to knit the insights of ecology into our political and economic structures. After more than three decades of teaching biology and helping building a more democratic and more broad-minded labor movement, I was recognized for my work with an honorary degree from Swarthmore College, the place where I first met Ernie Schuyler. Today, I am working to unite the labor movement with the environmental movement in a common effort to create jobs that are ecologically and economically sustainable.

Without Ernie Schuyler's support on several occasions, my life would almost certainly have taken a very different course. I am very grateful that he allowed a young social change activist the opportunity to pursue a career that could ultimately unite the pursuit of ecology with the pursuit of social justice.

John W. Braxton

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BARTONIA

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Research papers communicate original research in plant ecology, plant conservation biology, plant systematics, and related topics. Other contributed papers convey the results of studies in floristics, distribution, methods, biography, bibliography, history of botanical exploration, and other topics of botanical interest. Short reports of one or two pages appear in "News and Notes." Other items include obituaries, book reviews, and field trip reports. The focus is on the mid-Atlantic region (Pennsylvania, New Jersey, Delaware, Maryland, New York, Virginia, and West Virginia), but contributions of interest to *Bartonia* readers from farther afield are welcomed.

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